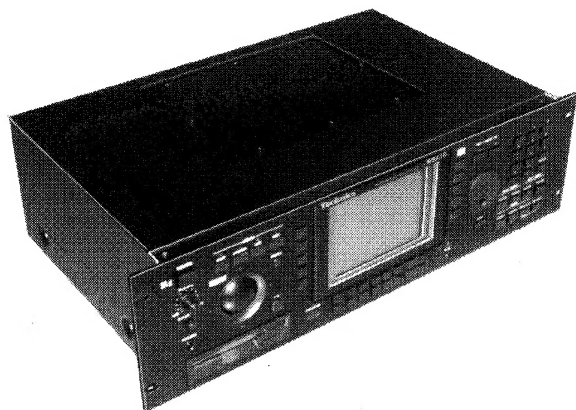


# Service Manual

## SYNTHESIZER MODULE

### SX-WSA1R



(M), (MC), (XM), (EN), (EH), (EF), (EZ), (EW), (EA),  
(EP), (EK), (XL), (XR), (XS), (XD), (XT), (X), (XP)

#### AREAS

(M): U.S.A.	(EK): the United Kingdom
(MC): Canada	(XL): New Zealand
(XM): Mexico	(XR): Australia
(EN): Norway, Sweden, Denmark, Finland	(XS): Malaysia
(EH): Holland, Belgium	(XD): Saudi Arabia, Hong Kong, Kuwait
(EF): France, Italy	(XT): Taiwan
(EZ): Germany	(X): Thailand, Indonesia, Iran, U.A.E., Panama,
(EW): Switzerland	Argentina, Peru, Brasil
(EA): Austria	(XP): Philippines
(EP): Spain, Portugal, Greece, Singapore, South Africa	

#### ⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

#### ■ Specifications

SOUND GENERATOR	ACOUSTIC MODELING SYNTHESIS	
MAXIMUM NUMBER OF NOTES PRODUCED SIMULTANEOUSLY	64 NOTES (32 PARTS MAX.)	
SOUND	PRESET (ROM): 256 SOUNDS +16 DRUM KITS, 128 COMBINATIONS USER: 256 SOUNDS + 4 DRUM KITS, 128 COMBINATIONS RE-MAP: 1, 2, 3 (GENERAL MIDI)	
BANK	USER 1, 2, ROM/EXT	
CONTROLLER	REALTIME CREATOR	
EDIT	SOUND	MODELING, TONE LAYER, PITCH, FILTER, AMPLITUDE, DIGITAL EFFECT, DSP EFFECT, CONTROLLER
	COMBINATION	INTERNAL SOUND, MIDI SOUND, CONFIGURE, MIXER, DSP EFFECT
DIGITAL EFFECT	12 TYPES	
DSP EFFECT	EFFECT 44 TYPES, REVERB 12 TYPES	
PART	INTERNAL SOUND, CONFIGURE, MIDI OUTPUT FILTER, MIXER, DSP EFFECT	
SYSTEM	TUNE & SCALE, TEST, CONTROLLER ASSIGN, MIXER, DSP EFFECT, INITIAL, RE-MAP EDIT, SOUND/COMBI MANAGER, DRUMS MAP, MAIN OUT EQUALIZER	
MIDI	TOTAL MODE, INPUT&OUTPUT FILTER, PROGRAM CHANGE MIDI OUT, SYSEX BULK DUMP, GENERAL MIDI	
DISK	BUILT-IN 3.5 inch FLOPPY DISK DRIVE FOR 2HD (1.44 MB), 2DD (720 KB) DISK LOAD, DISK SAVE, MIDI FILE DIRECT PLAY, DISK FORMAT, LOAD SINGLE SOUND, LOAD SINGLE COMBINATION	
DISPLAY	LCD (320×240 DOTS) PAGE, CONTRAST, EXIT	
OTHERS	VOLUME, DATA ENTRY DIAL/KEYS, COMPARE	
TERMINALS	PHONES, MAIN OUT (R, L/MONO), SUB OUT (R, L/MONO), MIDI (IN, OUT, THRU) ×2	
POWER REQUIREMENT	23 W, 35W (NORTH AMERICA)	
	AC120/220/240 V 50/60 Hz	
	AC120 V 60 Hz (NORTH AMERICA AND MEXICO)	
	AC230 V 50/60 Hz (NEW ZEALAND AND PHILIPPINES) AC230-240 V 50/60 Hz (EUROPE)	

# Technics

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DIMENSIONS (W × H × D )	48.2 cm × 14.1 cm × 25.2 cm (18-31/32" × 5-17/32" × 9-15/16")
NET WEIGHT	6.5 kg (14.3 lbs.)
ACCESSORIES	AC CORD, DEMO DISK, MIDI CABLE


•Specifications are subject to change without notice for further improvement.

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## WARNING

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To prevent the risk of fire, smoke, or electrical shock and to ensure safe operation, please be sure to follow the safety guidelines below.

1. At places where special caution is required, the necessary safety precautions are clearly labeled or printed, for example, on the cabinet, or on the part concerned. Please follow these safety precautions, and also those listed in the Owner's Manual.
2. Parts which have a  mark in the circuit diagram or in the parts list are essential for safety. When replacing these parts, be sure to use only the specified parts.
3. Use the specified types for internal wiring (double-insulated wiring, etc.).
4. When replacing parts on the AC primary side (power transformer, electric switch, electrical cord, noise-prevention condenser, etc.), wind the lead wire and secure it by soldering.
5. Do not let the wiring come into contact with heat-emitting devices (fuse resistor, radiator plate, etc.).
6. When replacing the wiring, make sure that it is not in contact with the unfinished or rough edge of a part.
7. When replacing the power cord (except for the plug-in type), tug it from various directions to confirm that it does not slip out of place.
8. Spacing  
If soldering was done on the AC primary circuit, confirm that the interval between the soldered terminals or between the terminal and surrounding metallic parts is at least the minimum required (Between the primary circuit and the chassis: at least 6.5 mm; between primary circuit terminals: at least 4.0 mm; between primary circuit terminals and secondary circuit terminals: at least 6.5 mm.).

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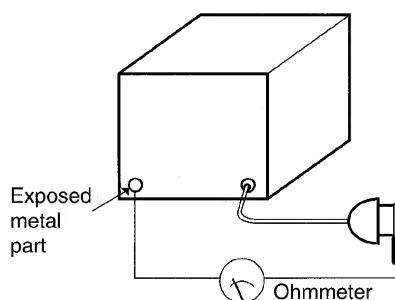
# SAFETY PRECAUTION (This "safety precaution" is for the U.S.A. only)

## ● Safety Precaution

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc..
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

## ● Insulation Resistance Test

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screw heads, connectors, control shafts, handle brackets, etc..Measurements should range from 4 MΩ to infinity for all exposed parts.

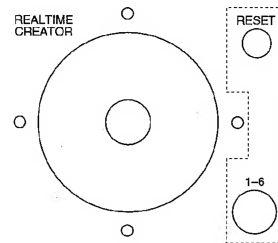
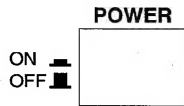


Resistance = 4MΩ to ∞

# INITIAL SETTING

■ The initial setting function is used to return to the original factory settings, and to reset the customer settings and misoperations.

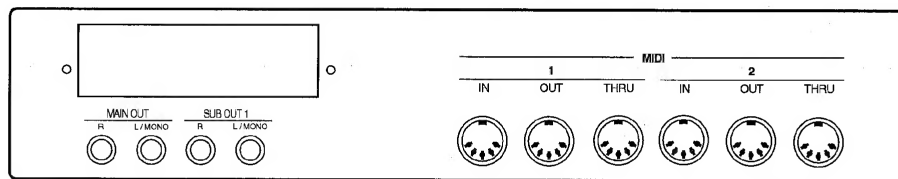
1. Press the **POWER** button to turn off the instrument.
2. While pressing the **1-6** button and the **RESET** button in the **REALTIME CREATOR** section at the same time, turn the **POWER** button on again.



## NOTE:

All stored data (**SOUND** and **COMBINATION** data is preserved.) are initialized with this operation.

# TERMINALS



(on the rear panel)

## MAIN OUT (Output level 1.5 Vrms, 600 $\Omega$ )

This terminal is for main output. To output monaural signals, connect the external equipment to the **L/MONO** terminal. (Do not connect the **R** terminal.)

## SUB OUT 1 (Output level 1.5 Vrms, 600 $\Omega$ )

This terminal is for sub output. To output monaural signals, connect the external equipment to the **L/MONO** terminal. (Do not connect the **R** terminal.)

## MIDI (Musical Instrument Digital Interface)

MIDI is the standard specification that enables connection to equipment such as synthesizers and personal computers. Data transmission and reception are possible between the Technics Synthesizer Module and other instrument provided with MIDI terminals.

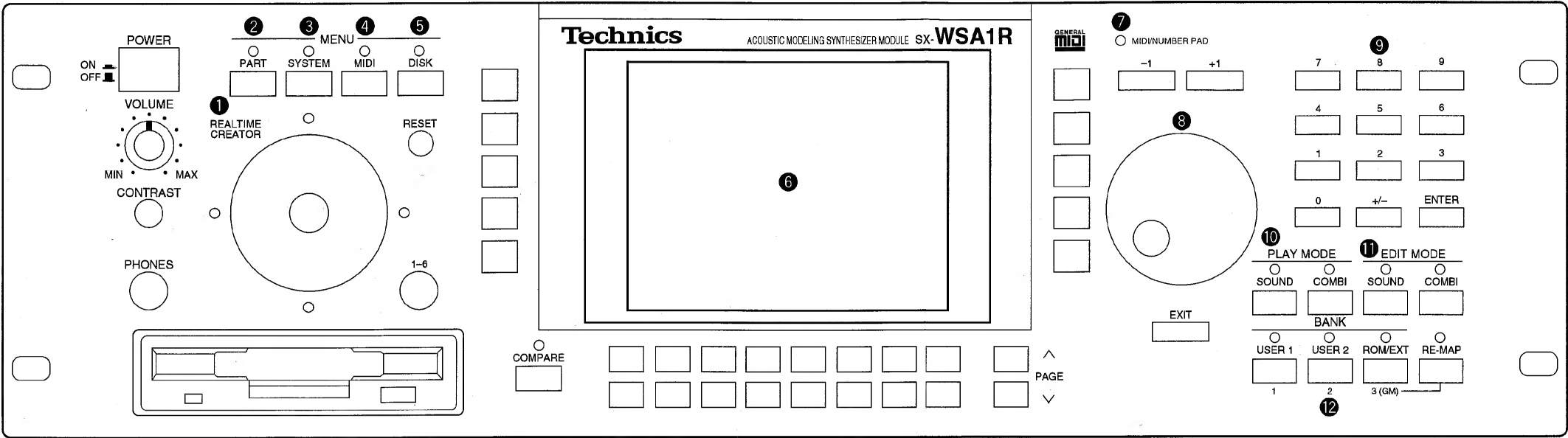
**IN :** The terminal that receives data from external equipment.

**OUT :** The terminal that transmits data from this instrument to external equipment.

**THRU:** The terminal that transfers data from the **IN** terminal directly to other equipment.

- Use a 5-pin DIN cord (less than 15 m long) for these connections.

# ARRANGEMENT OF CONTROL PANEL



**1 REALTIME CREATOR**

Modify the characteristics of the sounds during your performance. You can return the sound to its original state by pressing the **RESET** button.

**2 PART**

The settings for each part of this instrument can be adjusted to serve your personal preferences and requirements.

**3 SYSTEM**

The settings for the whole instrument can be adjusted.

**4 MIDI**

Select the various settings which are used for **MIDI** operation of this instrument.

**5 DISK**

The Disk Drive enables you to store panel data, sound data, etc. for future use.

**6 Display**

The display shows the status of your performance and the various instrument settings at a glance.

**7 MIDI / NUMBER PAD indicator**

The indicator is lit when MIDI data is begin received, or when the number pad can be used to enter number.

**8 Data entry controls**

Use these controls when setting a function and specifying a numerical value.

**9 Number pad**

Input and enter numbers during setting procedures.

**10 PLAY MODE**

Two modes are available for playing this instrument.

**11 EDIT MODE**

Edit **SOUND** and **COMBINATION**.

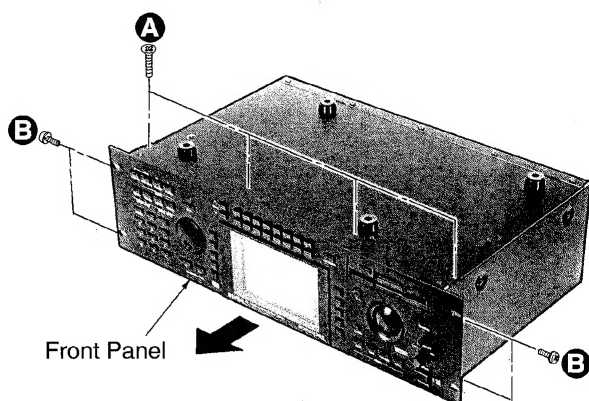
**12 BANK**

Select the bank of the **SOUND** or **COMBINATION** used for your performance.

# DISASSEMBLY INSTRUCTIONS

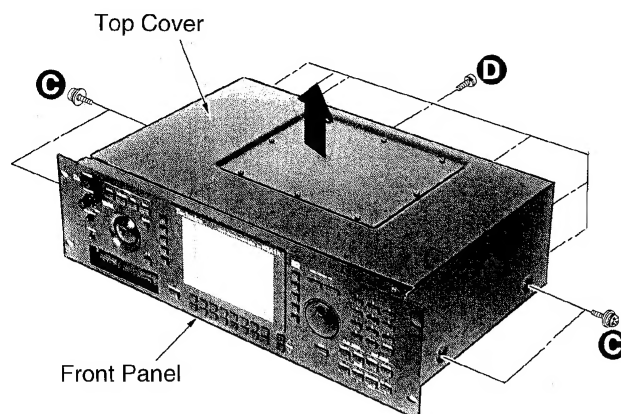
## 1 Removing the front panel and the top cover

1. Turn the unit up side down as shown in Fig. 1, and remove the screws (A 4 pcs. and B 4 pcs.).
2. Pull out the front panel slightly.



[Fig. 1]

3. Place the unit bottomsides down.
4. Remove the top cover holding screws (C 4 pcs. and D 7 pcs.).
5. Lift the top cover straight up to remove it.
6. Remove the front panel from the unit.



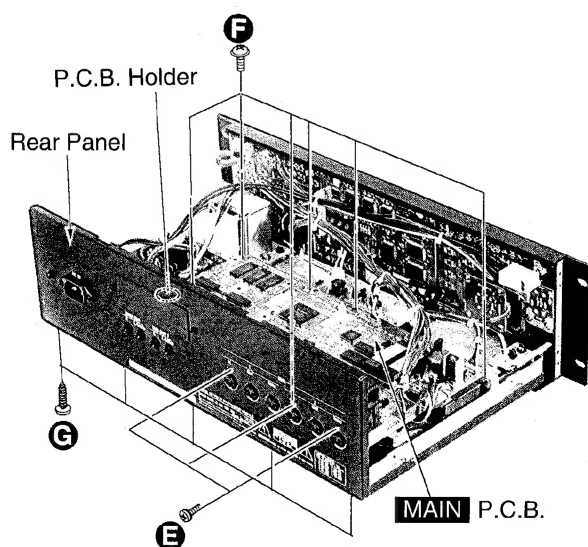
[Fig. 2]

## 2 Removing the MAIN, ACP, and INV printed circuit boards

- Open the top cover (see step 1).

### MAIN P.C.B.

1. Remove the MAIN P.C.B. holding screws (E 3 pcs. and F 6 pcs.).
2. Remove the rear panel holding screws (G 5 pcs.), and remove the rear panel.
3. Release the claw of the P.C.B. holder.



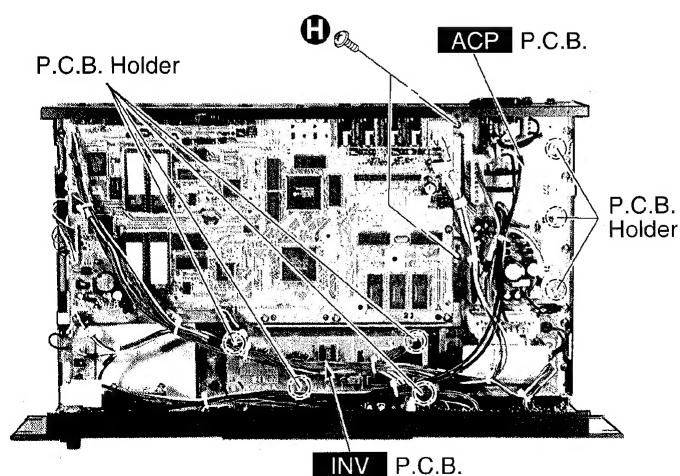
[Fig. 3]

### ACP P.C.B.

1. Remove the ACP P.C.B. holding screws (H 2 pcs.).
2. Release the claw of the P.C.B. holder.

### INV P.C.B.

- Release the claw of the P.C.B. holder.



[Fig. 4]

### 3 Removing the CP1, LCD, MB2, CP2, and HP printed circuit boards

- Remove the front panel from the unit (see step 1).

#### CP1 P.C.B.

- Remove the CP1 P.C.B. holding screws (I 14 pcs.).

#### LCD P.C.B.

- Remove the LCD P.C.B. holding screws (J 4 pcs.).

#### MB2 P.C.B.

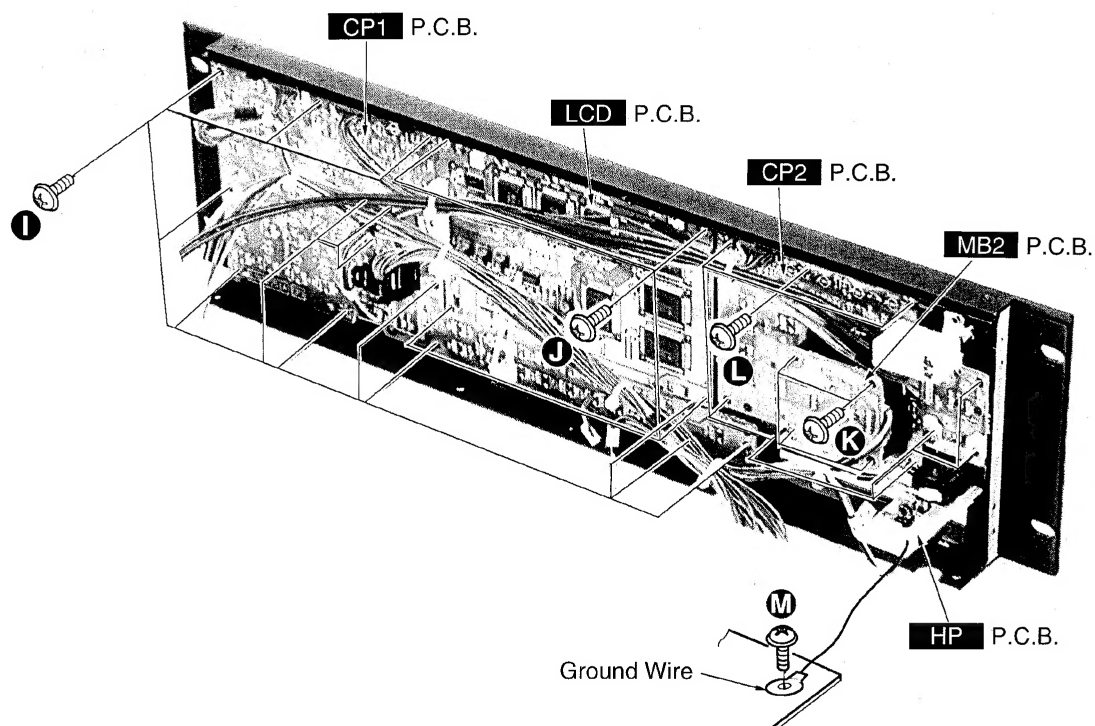
- Remove the MB2 P.C.B. holding screws (K 4 pcs.).

#### CP2 P.C.B.

- Remove the CP2 P.C.B. holding screws (L 9 pcs.).

#### HP P.C.B.

1. Of the CP2 P.C.B. holding screws (L 9 pcs.), remove the 2 which are also HP P.C.B. holding screws.
2. Remove the ground wire holding screw (M 1 pc.).



[Fig. 5]

# SYMPTOMS WHICH APPEAR TO BE SIGNS OF TROUBLE

The following changes in performance may occur in the Technics Synthesizer Module but do not indicate trouble.

Phenomenon		Remedy
Sounds and effects	The buttons, keys, etc. malfunction.	<ul style="list-style-type: none"> <li>• Turn off the <b>POWER</b> button once, then turn it on again. If this procedure is not successful, turn off the <b>POWER</b> button once. Then, while pressing the <b>REALTIME CREATOR 1-6</b> button and <b>RESET</b> button at the same time, turn the <b>POWER</b> button on again.</li> </ul>
	No sound is produced when the keys are pressed.	<ul style="list-style-type: none"> <li>• The <b>VOLUME</b> is at the minimum setting. Adjust the volume with the <b>VOLUME</b> control.</li> <li>• The volumes for the selected parts are set to the minimum levels. Set the volumes of the relevant parts to appropriate levels.</li> </ul>
	Only percussive instrument sounds are produced when the connected keyboard is played.	<ul style="list-style-type: none"> <li>• The <b>DRUM</b> bank is selected.</li> </ul>
	Some sounds cannot be selected.	<ul style="list-style-type: none"> <li>• When the <b>GENERAL MIDI</b> status is set to on, The sounds which can be selected and operation which can be executed are limited. Turn the <b>GENERAL MIDI</b> status off to return the instrument to its normal operation.</li> </ul>
	You tried to store an edited sound, but it could not be stored.	<ul style="list-style-type: none"> <li>• You cannot store a sound if <b>MEMORY PROTECT</b> is set to <b>ON</b>; set it to <b>OFF</b>.</li> </ul>



Phenomenon		Remedy
Disk Drive	The Disk Drive produces a noise during recording or playback.	<ul style="list-style-type: none"> <li>• This occurs when the Disk Drive is reading a disk. It does not indicate a problem.</li> </ul>
	When the procedure to load from a disk is performed, the contents of this instrument's memory are erased.	<ul style="list-style-type: none"> <li>• When performing the load operation from a disk, this instrument's memory changes to that of the data loaded from the disk. If you wish to preserve data which are stored in the memory, save it on a disk before performing the load procedure.</li> </ul>
Other	Noise from a radio or TV can be heard.	<ul style="list-style-type: none"> <li>• This sometimes occurs when electrical equipment such as a radio or TV is used near the instrument. Try moving such electrical equipment further away from the instrument.</li> <li>• The sound may be coming from a nearby broadcast station or amateur radio station. If the sound is bothersome, consult your dealer or service center.</li> </ul>
	The cabinet becomes warm during use.	<ul style="list-style-type: none"> <li>• This instrument has a built-in power source that heats the cabinet to some degree. This is not an indication of trouble.</li> </ul>

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## ERROR DISPLAY

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No.	Contents
00	The data on the disk that you are using is for a different product.
01	An error has occurred while the disk was loading. Please try again!
02	There is no disk in the Disk Drive.
03	The file that you tried to load is empty.
05	An error has occurred while the disk was saving. Please try again!
06	The disk that you are using is write protected. Please remove the write protection and try again.
07	The disk that you are using is full. Please use another disk.
08	An error has occurred while the disk was formatting. The disk that you are using may be faulty. Please try formatting another disk.
10	The data is already copy protected.
21	Memory full
28	This song is too long to be saved as a MIDI file.
40	The Identification (ID) code of the system exclusive data received by the <b>WSA</b> is for a different product.
41	An error has occurred during system exclusive data reception. The data from the transmitting device may be incomplete. Please try again.
42	An error has occurred during system exclusive transmission. The data has not been received correctly. Please try again.
58	The song that you have tried to load exceeds the <b>WSA</b> 's available memory and cannot be loaded. The selected song memory has been cleared. Please clear existing songs in the instrument's memory using SONG CLEAR to make more memory available, and try again.

# ABOUT THE SELF-DIAGNOSTIC FUNCTION

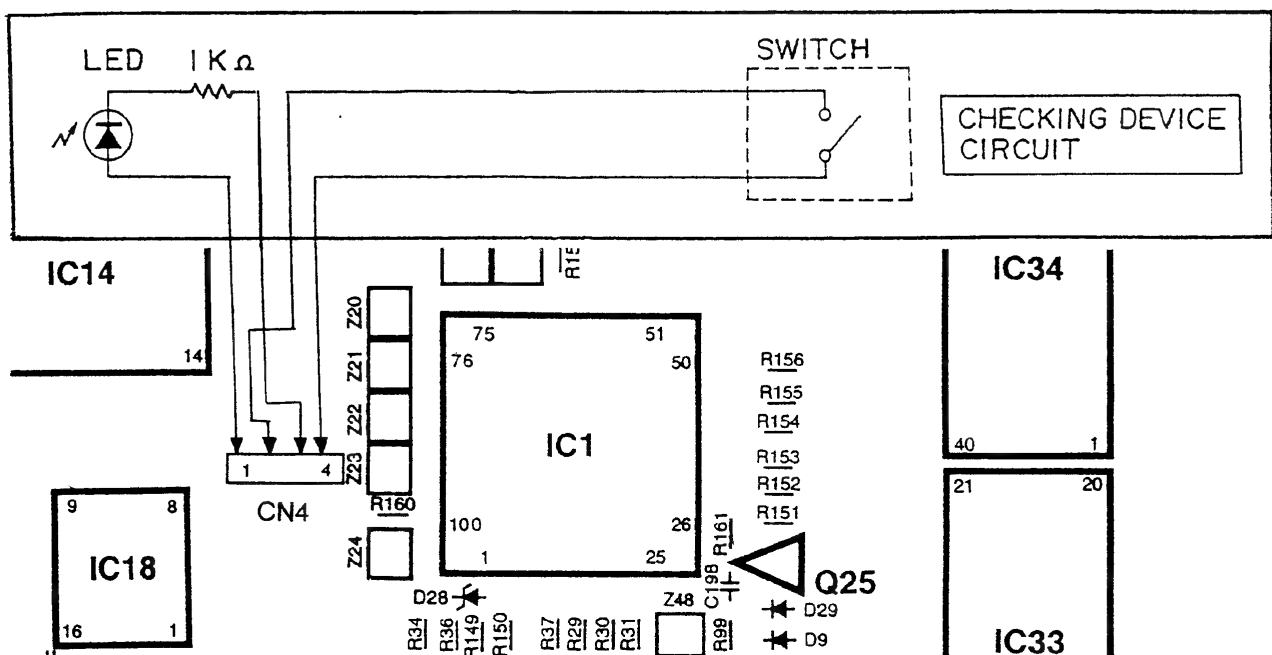
This model has some self-diagnostic capabilities. When set to the self-diagnostic mode, operation of various components can be verified by following the procedures in the chart below.

No.	PCB	TEST MODE	Procedure
1	MAIN	RAM (IC14, 15), ROM (IC11, 12) check	1. Connect the CHECKING DEVICE (refer to page I-12) to CN4 on the MAIN P.C.B., and turn on the CHECKING DEVICE switch. 2. Turn on the power switch.
		When the power switch is turned on, the LED of the CHECKING DEVICE flashes 8 times. The first 4 flashes are for the RAM check, and the latter 4 flashes are for the ROM check. The order of the LED flashes corresponds to the respective IC numbers as shown below. If an IC is defective, the corresponding flash time is longer.	
		Examples	<div><div><div>RAM</div><div>1234</div><div><div>●●●●</div><div>●●●●</div><div>●●●●</div><div>●●●●</div></div><div>IC14IC15IC11IC12</div></div><div>1. RAM OK, ROM OK</div><div>2. RAM OK, ROM (IC11, 12) defective</div><div>3. RAM (IC14) defective, ROM OK</div><div>NOTE : ● indicates short flash time ■ indicates long flash time</div></div>
2	CP1	CPU (IC1) check	1. Connect the CHECKING DEVICE to CN4 on the MAIN P.C.B. (The CHECKING DEVICE switch should be off). 2. Press and hold the 2 key on the Number Pad, and then turn on the power switch.
		When the power switch is turned on, the LED of the CHECKING DEVICE flashes 4 times. The order of the LED flashes corresponds to the CPU (IC) on the respective P.C.B.s as shown below. If an IC is defective, the corresponding flash time is longer.	
			<div><div><div>1234</div><div><div>■■●</div><div>■■■</div></div><div>CPU (IC1)</div></div><div>1. CPU (IC1) OK</div><div>2. CPU (IC1) defective</div><div>NOTE : ● indicates short flash time ■ indicates long flash time</div></div>
3	CP1 CP2	Control Panel LED check	Press and hold the 4 key on the Number Pad, and then turn on the power switch.
		Press the buttons on the control panel and confirm that the corresponding LEDs light.	

No.	PCB	TEST MODE	Procedure
4	MAIN	Wave ROM check MAIN: IC43-45, 47-49 Generator IC Outsel check	Press and hold the <b>3</b> key on the Number Pad, and then turn on the power switch.
		When set to the self-diagnostic mode, the Wave ROM outputs a sine wave. The Wave ROMs correspond to the buttons as shown in the diagram to the right. When a button is pressed, the corresponding sine wave sound is produced. If no sound is produced, or if the sound is distorted, the Wave ROM corresponding to that button is defective.	<ul style="list-style-type: none"> <li>The button indicates the Wave ROM number. (I-①: IC43, I-②: IC47, II-①: IC44, II-②: IC48, III-①: IC45, III-②: IC49)</li> </ul> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 10px; margin-right: 10px;">LCD Display</div> <div style="display: flex; flex-direction: column; gap: 5px;"> <input type="checkbox"/> ← (I-①, I-②)  <input type="checkbox"/> ← (II-①, II-②)  <input type="checkbox"/> ← (III-①, III-②)  <input type="checkbox"/>  <input type="checkbox"/> </div> </div> <ul style="list-style-type: none"> <li>Generator IC Outsel check (①: MAIN OUT, ②: SUB OUT 1, ③: SUB OUT 2, ④: SUB OUT 3)</li> </ul> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 10px; margin-right: 10px;">LCD Display</div> <div style="display: flex; flex-direction: column; gap: 5px;"> <input type="checkbox"/> ← ①  <input type="checkbox"/> ← ②  <input type="checkbox"/> ← ③  <input type="checkbox"/> ← ④  <input type="checkbox"/> </div> </div>
5	LCD	LCD check	Press and hold the <b>5</b> key on the Number Pad, and then turn on the power switch.
		When set to the self-diagnostic mode, the test pattern is shown on the display. Monitor the display to confirm that the characters appear correctly.	

### ■ Connection between serving CHECKING DEVICE and MAIN P.C.B.

**NOTE:** The order of the MAIN P.C.B. terminals differs from previous models.



# MIDI IMPLEMENTATION CHART

Synthesizer Module [SX-WSA1R]

(Transmitted)

Function		PART1 ~ 32	Remarks
Basic Channel	Default	1-1 ~ 2-16	MIDI1: 1-1 ~ 1-16, MIDI2: 2-1 ~ 2-16
	Changed	1-1 ~ 2-16	Single Channel: 1-1 ~ 1-16
MODE	Default	3	OMNI OFF, POLY MODE
	Messages	×	
	Altered	—	
Note Number	True Voice	0-127 —	
Velocity	Note ON	○	
	Note OFF	×	
After Touch	Key's	×	
	Ch's	○×*	
Pitch Bend		○×*	
Control Change	0,32	○×*	bank select MSB, LSB modulation 1, 2 default control pedal default data entry MSB, LSB volume panpot expression realtime creator X, Y default realtime controller X, Y default hold1 realtime creator SW1-6 reverb depth effect1, 2 depth RPN LSB, MSB all sound off reset all controllers
	1,2		
	4		
	6,38		
	7		
	10		
	11		
	16,17		
	18,19		
	64		
	81		
	91		
	93,94		
	100,101		
	120		
	121		
Prog Change		○×*	
	True#	—	
System Exclusive		○×*	
System Common	Song Pos	○×*	MIDI 1 only
	Song Sel	○×*	MIDI 1 only
	Tune	×	
System Real time	Clock	○	MIDI 1 only
	Commands	○×*	MIDI 1 only
Aux Messages	Local ON/OFF	×	
	ALL notes OFF	×	
	Active Sense	○	
	Reset	×	
Notes		○×*.....Whether or not the data for each of these items is transmitted can be set.	

**Mode1:** OMNI ON,POLY  
**Mode3:** OMNI OFF,POLY

**Mode2:** OMNI ON,MONO  
**Mode4:** OMNI OFF,MONO

○:Yes  
 ×:No

Function		PART1 ~ 32	Remarks
Basic Channel	Default	1-1 ~ 2-16	MIDI1: 1-1 ~ 1-16, MIDI2: 2-1 ~ 2-16
	Changed	1-1 ~ 2-16	Single Channel: 1-1 ~ 1-16
MODE	Default	3	OMNI OFF, POLY MODE
	Messages	×	
	Altered	—	
Note Number	True Voice	0-127	Normal Sound:12-120, Drum Sound:0-127
		12-120/0-127	
Velocity	Note ON	○	
	Note OFF	×	
After Touch	Key's	×	
	Ch's	○×*	
Pitch Bend		○×*	
Control Change	0,32	○×*	bank select MSB, LSB modulation 1, 2 default control pedal default data entry MSB, LSB volume panpot expression realtime creator X, Y default realtime controller X, Y default hold1 realtime creator SW1-6 reverb depth effect1, 2 depth RPN LSB, MSB all sound off reset all controllers
	1,2		
	4		
	6,38		
	7		
	10		
	11		
	16,17		
	18,19		
	64		
	81		
	91		
	93,94		
	100,101		
	120		
	121		
Prog Change	True#	○×*	
		0-127	
System Exclusive		○×*	
System Common	Song Pos	○×*	MIDI 1 only
	Song Sel	○×*	MIDI 1 only
	Tune	×	
System Real time	Clock	○×*	MIDI 1 only
	Commands	○×*	MIDI 1 only
Aux Messages	Local ON/OFF	×	
	ALL notes OFF	○	
	Active Sense	○	
	Reset	×	
Notes		○×*.....Whether or not the data for each of these items is recognized can be set.	

**Mode1:** OMNI ON, POLY  
**Mode3:** OMNI OFF, POLY

**Mode2:** OMNI ON, MONO  
**Mode4:** OMNI OFF, MONO

I - 14


○: Yes  
 ×: No

# PRECAUTIONS BEFORE SERVICING

## ■ Precautions for measuring of the output waveforms.

1. The waveform was measured with a "National Digital Storage Oscilloscope VP-5730A". Therefore the waveforms of musical tone signals shown may differ somewhat due to the difference in the timing of triggering.
2. Since the 1/10 test probe is used, the indicated voltage value on the bottom part of each waveform photo is 1/10 of the actual value (e.g. 0.2 V/cm should be 2.0 V/cm).
3. To measure the waveforms, first set this unit to the self-diagnostic mode (refer to page I-12, No. 4). The Wave ROM output will then be output as a sine wave to facilitate the servicing check.

## ■ Important safety notice:

Components identified by a  mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.








## ■ Symbolic Marks

The symbolic marks for resistors and capacitors which used in this circuits are classified as following TABLE-1 and TABLE-2.

### 1. RESISTORS

- Resistors without symbolic mark are FIXED CARBON FILM RESISTORS (ERD-type).
- All resistors are 1/4 WATT,  $\pm 5\%$  TOLERANCE unless otherwise designated in schematic diagrams.






(TABLE-1)

SYMBOL	SPECIFICATION	SYMBOL	SPECIFICATION
	Fixed Carbon Film Resistors "FLAME-PROOF" (ERD—F—type)		Fixed Metal Film Resistors "FLAME-PROOF" (ERX—type)
	Fixed Wire Wound Resistors "FLAME-PROOF" (ERF—type)		Fuse Type Fixed Metal Oxide Film Resistors "FLAME-PROOF" (ERQ—type)
	Fixed Metal Oxide Film Resistors "FLAME-PROOF" (ERG—type)		Fuse Type Fixed Carbon Film Resistors "FLAME-PROOF" (ERD2FC—type)
	Fixed Metal Film Resistors (Precision and High Stability) (ERO—type)		

### 2. CAPACITORS

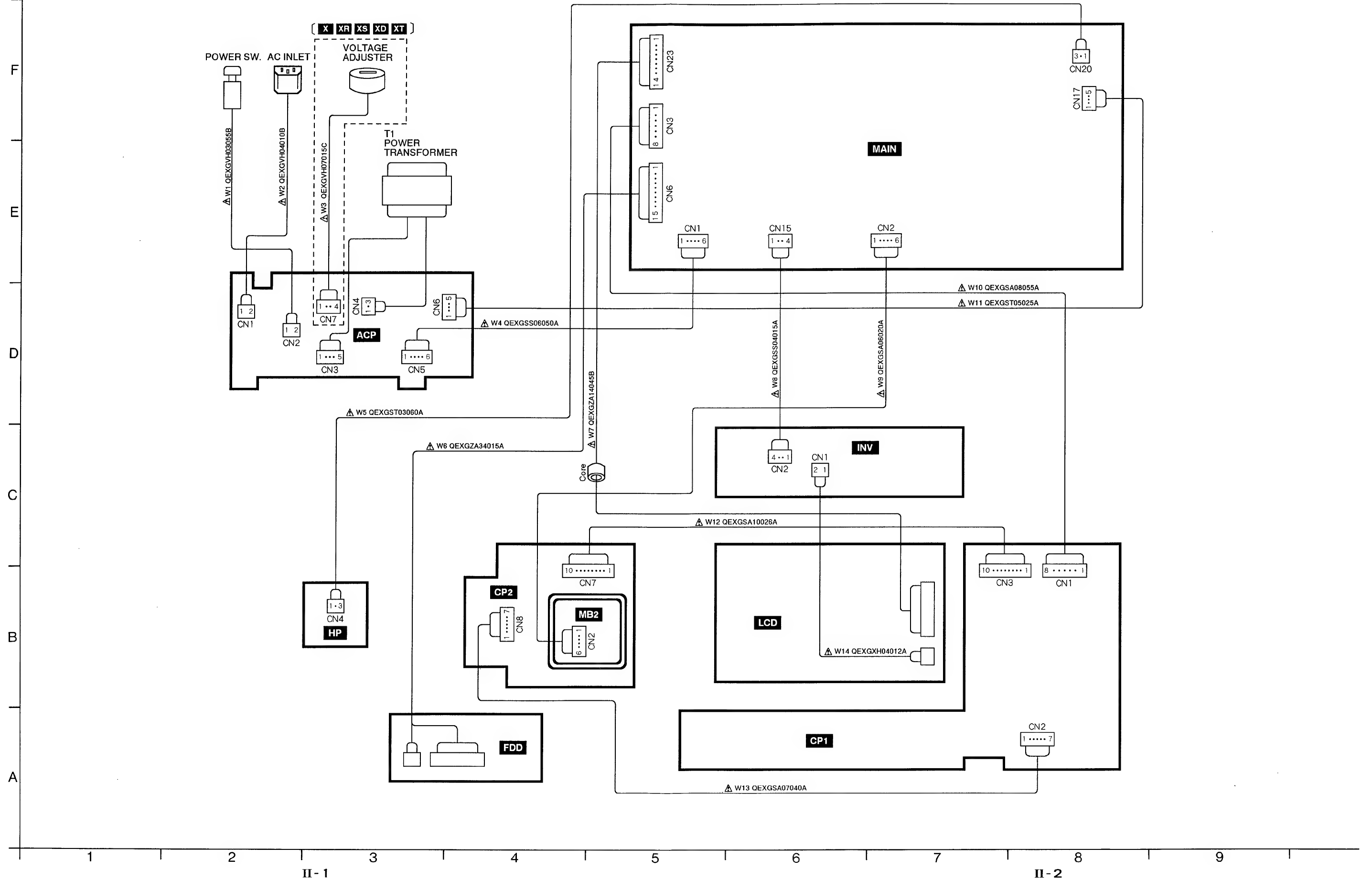
- Capacitors without symbolic mark are POLYESTER CAPACITORS. (ECQM-type, ECQG-type,  $\pm 10\%$  Tolerance)
- Polarized capacitors without symbolic mark are Aluminum Electrolytic Capacitors. (ECEA-type,  $\pm 20\%$  Tolerance)

(TABLE-2)

SYMBOL	SPECIFICATION	TYPE
	Non-Polarized Electrolytic Capacitors	ECEA_KN_type
	Non-Polarized Electrolytic (for Network system)	ECEA_Y_type
	Tantalum Solid Electrolytic Capacitors	ECS_type
	Metalized Plastic Film Capacitors (TF Series)	ECQV_type
	Temperature Compensating Ceramic Capacitors	ECC_type
	High-Dielectric Constant Ceramic Capacitors	ECK_type ECR_type
	Axial Lead Ceramic Capacitors	ECB_type
	Metalized Polyester Film Capacitors for Across the Line	ECQ_EW_type
	Aluminum Electrolytic Capacitors for Smoothing Circuit	ECES_type
	Multilayer Ceramic Chip Capacitors	ECUV_type

# WIRING CONNECTION Diagram

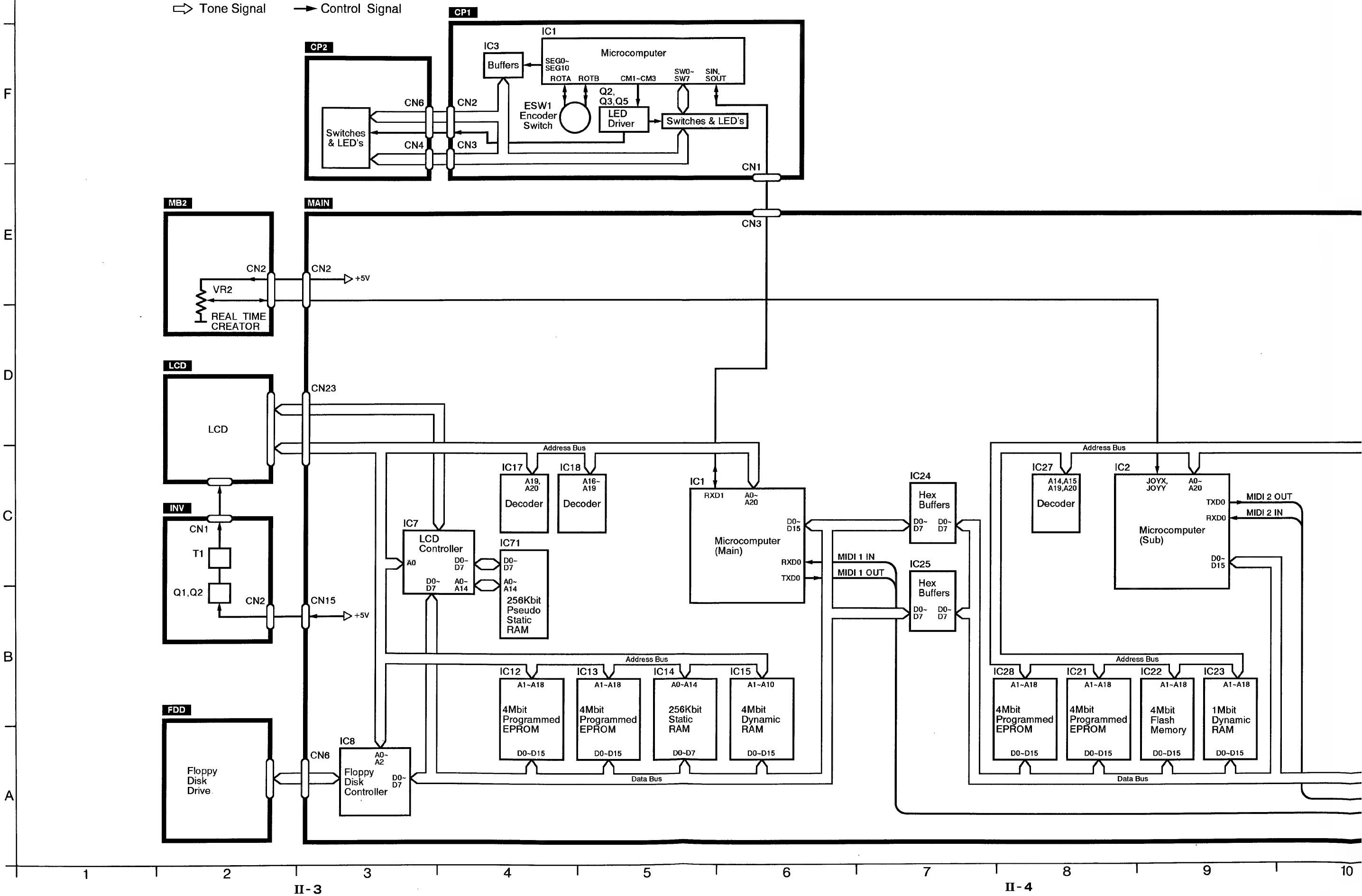
## WIRING CONNECTION Diagram

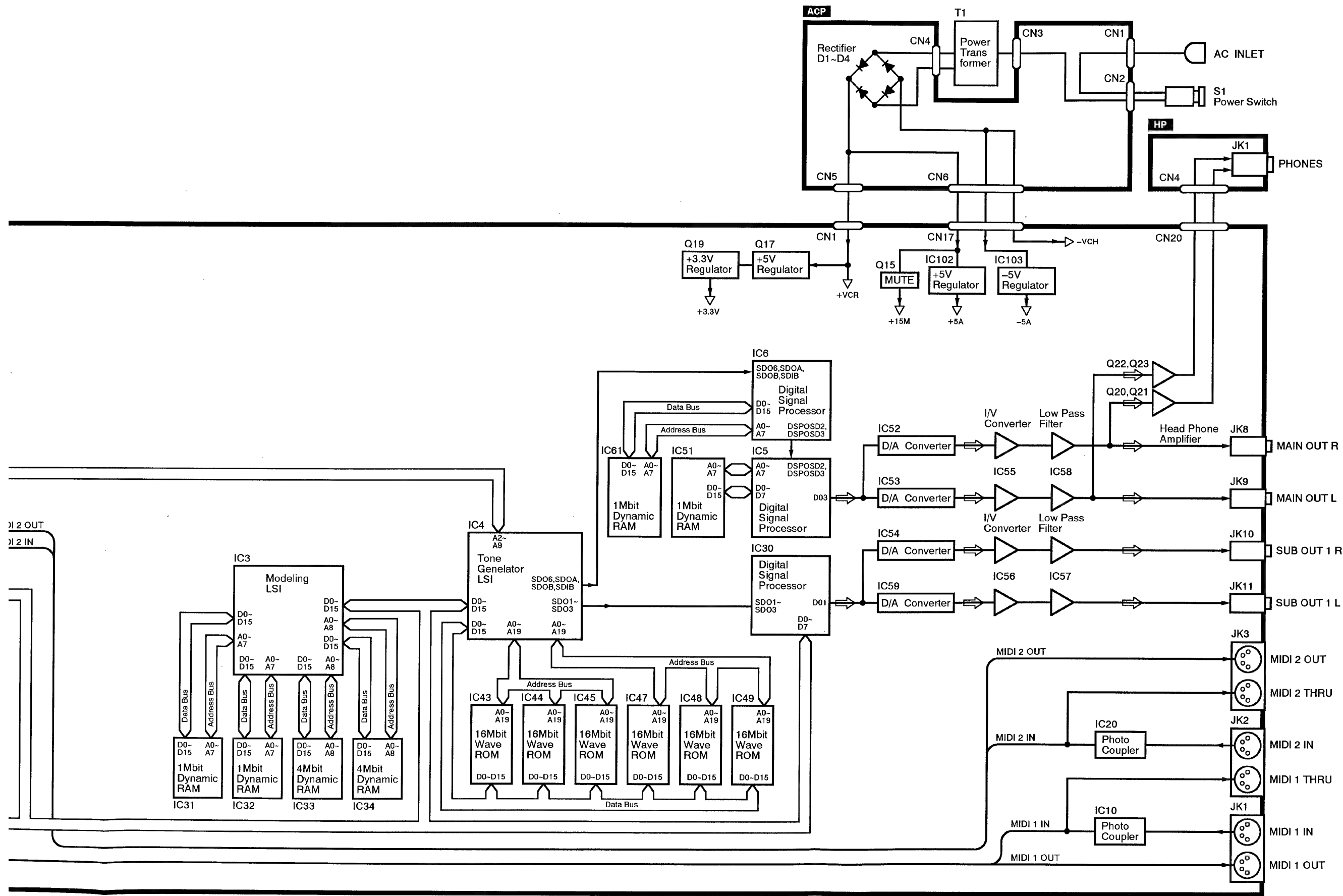




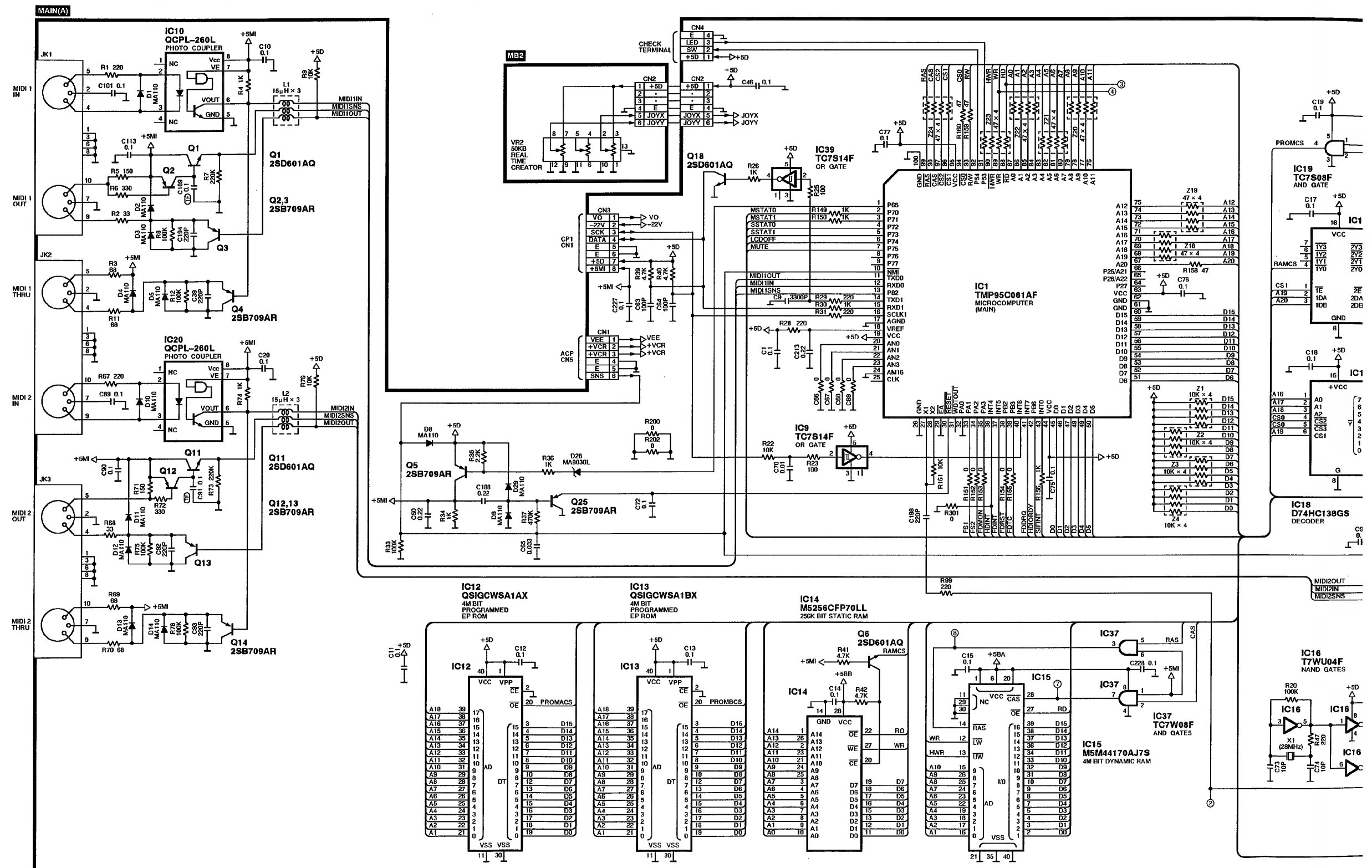
BLOCK Diagram

⇨ Tone Signal      → Control Signal





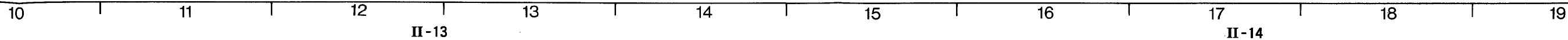
### MAIN (A)/MB2 P.C. Diagram



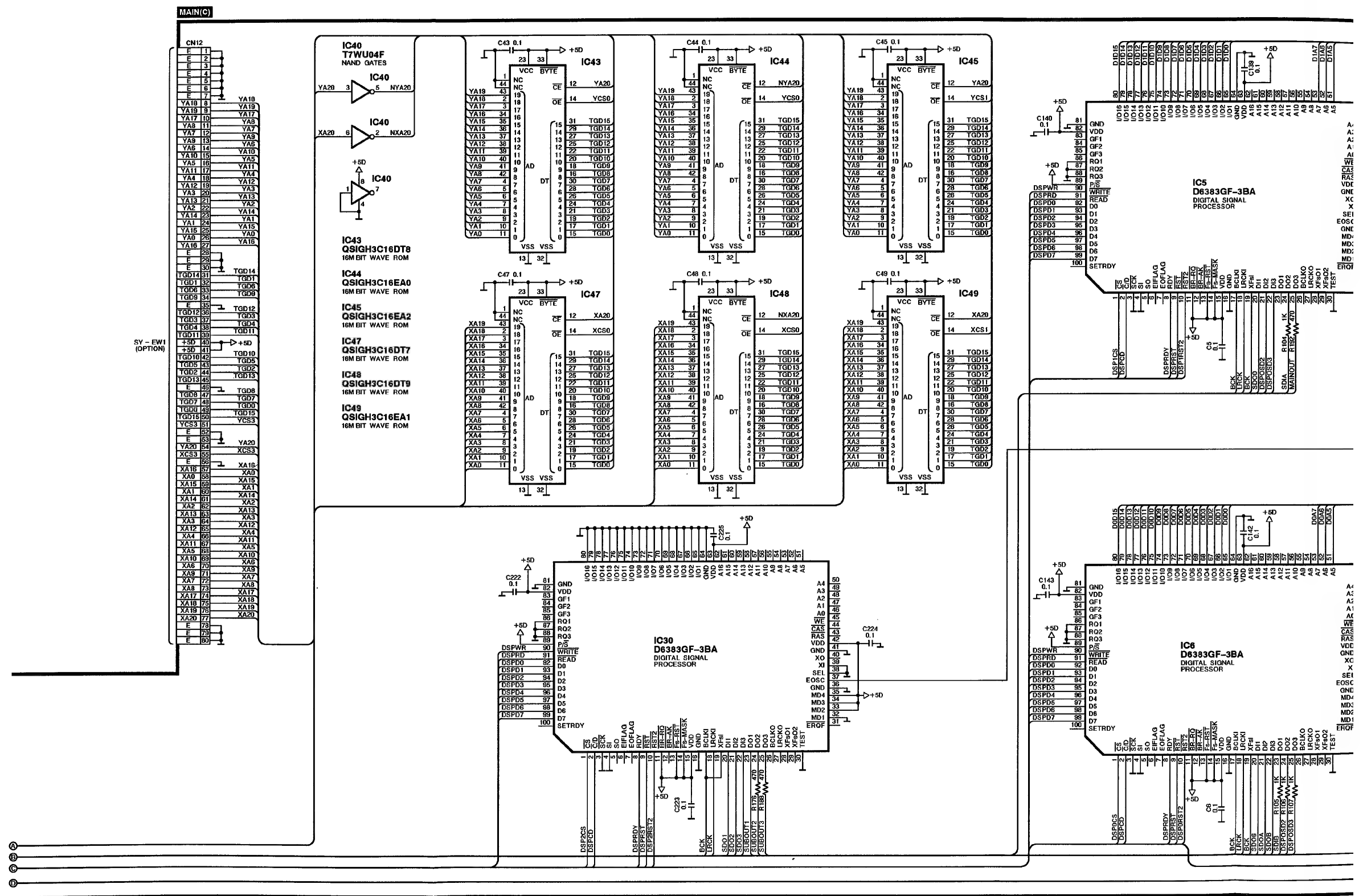


## A





## MAIN (C)/HP P.C. Diagram







MAIN(SXPG223021)(COMPONENT SIDE)

IC1, IC2, IC3, IC4, IC5, IC6, IC7, IC8, IC9, IC10, IC11, IC12, IC13, IC14, IC15, IC16, IC17, IC18, IC19, IC20, IC21, IC22, IC23, IC24, IC25, IC26, IC27, IC28, IC29, IC30, IC31, IC32, IC33, IC34, IC35, IC36, IC37, IC38, IC39, IC40, IC41, IC42, IC43, IC44, IC45, IC46, IC47, IC48, IC49, IC50, IC51, Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, Q21, Q22, Q23, Q24, Q25, CN1, CN2, CN3, CN4, CN5, CN6, CN7, CN8, CN9, CN10, CN11, CN12, CN13, CN14, CN15, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100, D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34, D35, D36, D37, D38, D39, D40, D41, D42, D43, D44, D45, D46, D47, D48, D49, D50, D51, D52, D53, D54, D55, D56, D57, D58, D59, D60, D61, D62, D63, D64, D65, D66, D67, D68, D69, D70, D71, D72, D73, D74, D75, D76, D77, D78, D79, D80, D81, D82, D83, D84, D85, D86, D87, D88, D89, D90, D91, D92, D93, D94, D95, D96, D97, D98, D99, D100, E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15, E16, E17, E18, E19, E20, E21, E22, E23, E24, E25, E26, E27, E28, E29, E30, E31, E32, E33, E34, E35, E36, E37, E38, E39, E40, E41, E42, E43, E44, E45, E46, E47, E48, E49, E50, E51, E52, E53, E54, E55, E56, E57, E58, E59, E60, E61, E62, E63, E64, E65, E66, E67, E68, E69, E70, E71, E72, E73, E74, E75, E76, E77, E78, E79, E80, E81, E82, E83, E84, E85, E86, E87, E88, E89, E90, E91, E92, E93, E94, E95, E96, E97, E98, E99, E100, F1, F2, F3, F4, F5, F6, F7, F8, F9, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F30, F31, F32, F33, F34, F35, F36, F37, F38, F39, F40, F41, F42, F43, F44, F45, F46, F47, F48, F49, F50, F51, F52, F53, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F68, F69, F70, F71, F72, F73, F74, F75, F76, F77, F78, F79, F80, F81, F82, F83, F84, F85, F86, F87, F88, F89, F90, F91, F92, F93, F94, F95, F96, F97, F98, F99, F100.

II-19

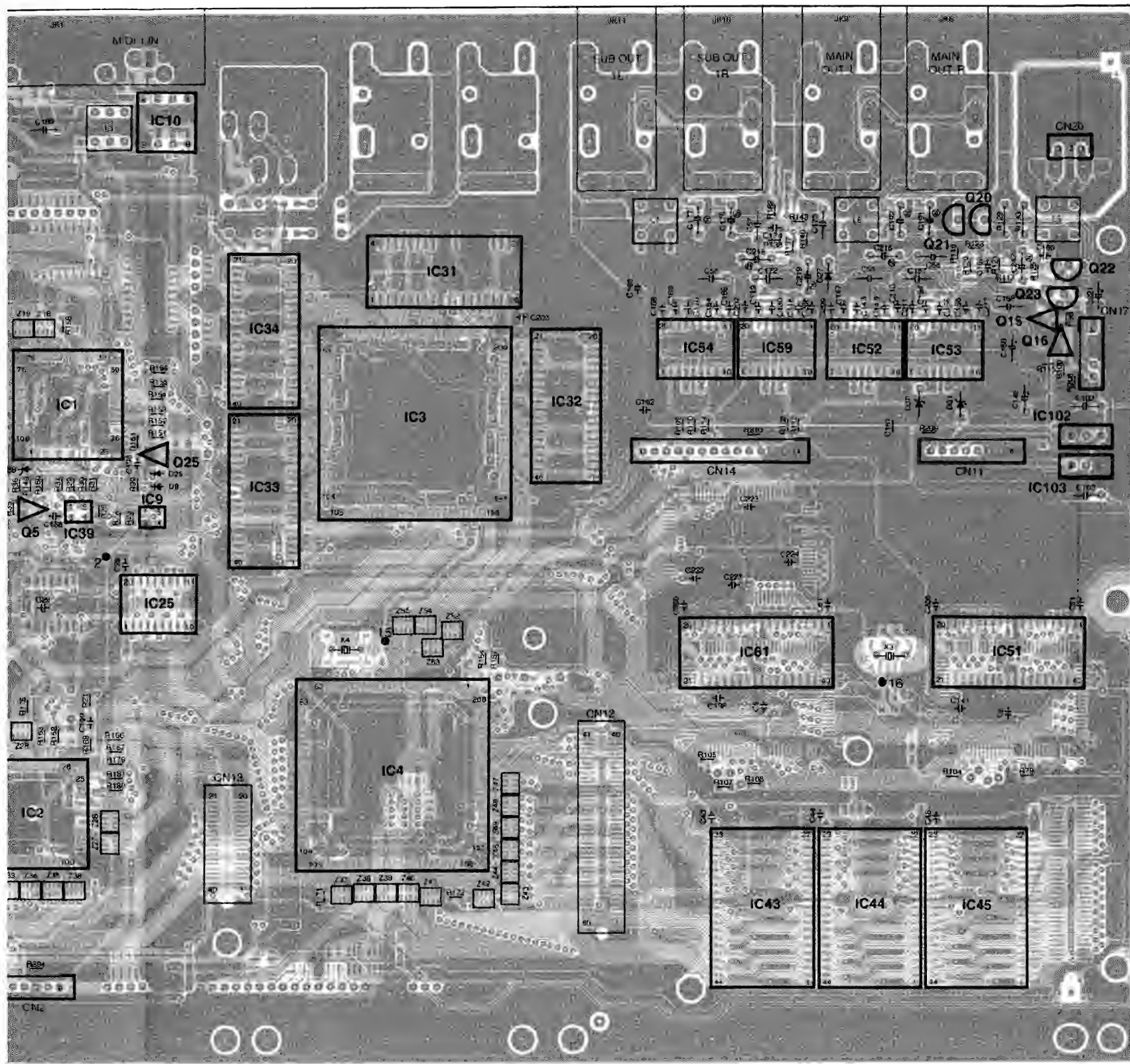
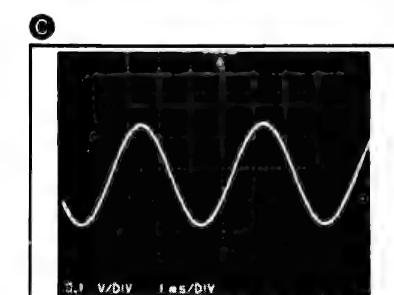
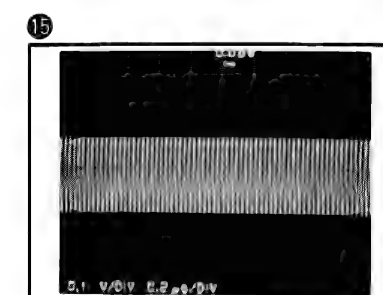
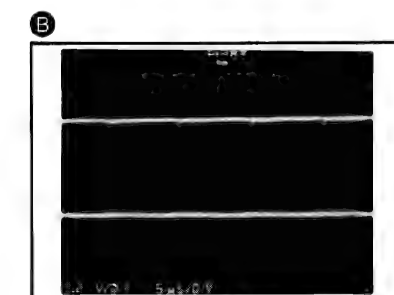
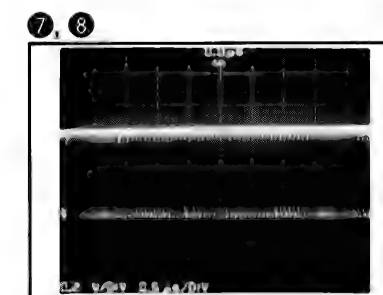
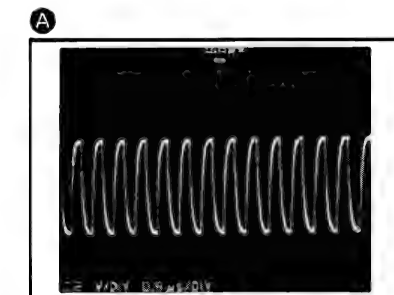
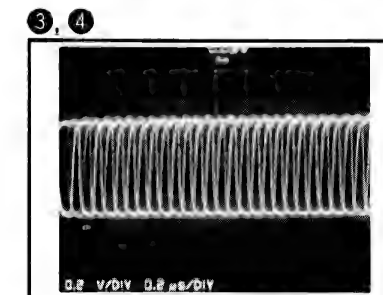
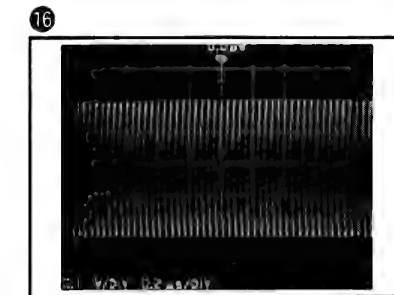
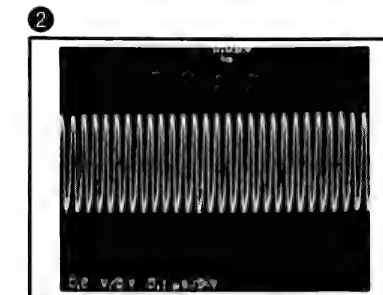
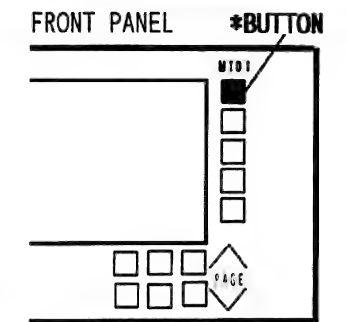
II-20



## Measuring Condition

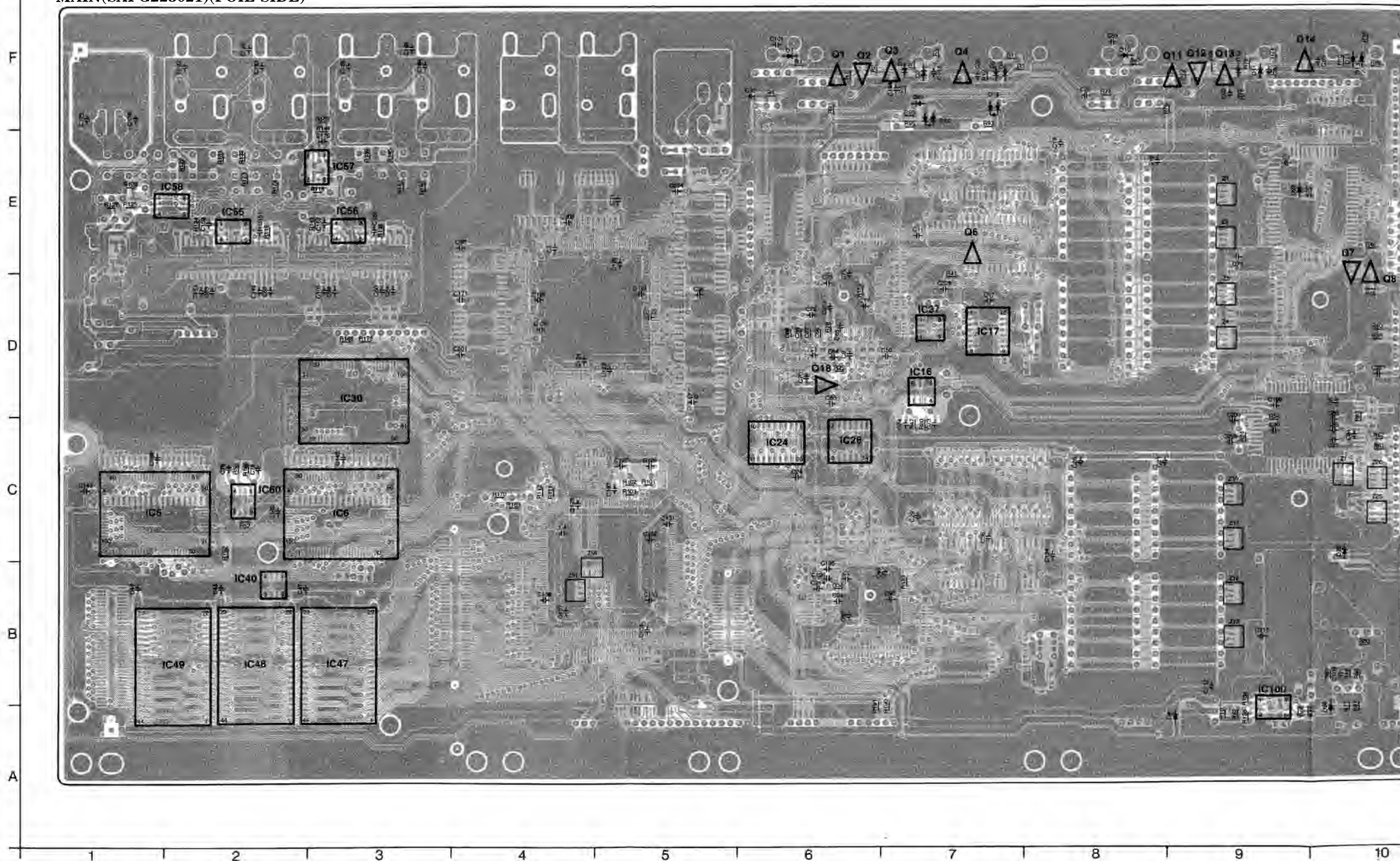
Set to the self-diagnostic mode followings.

- While pressing No. 3 BUTTON simultaneously, turn on the power switch.
- Check mode .....(6) SINE WAVE & ROM CHECK  
16dB DOWN.
- Volume .....MAX
- Press the \*BUTTON.

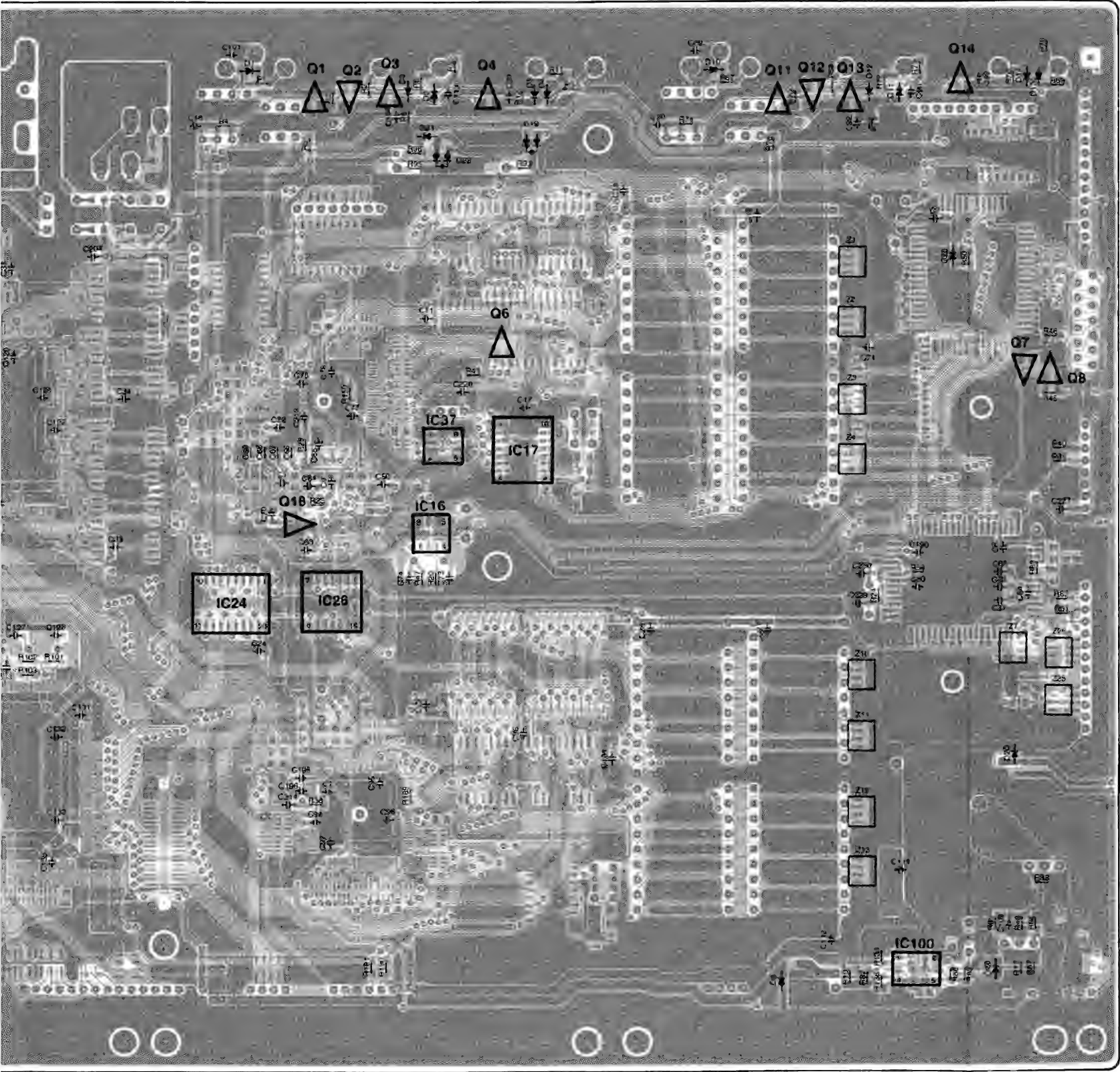


# MAIN (FOIL SIDE)/MB2/HP/ACP P.C. Board

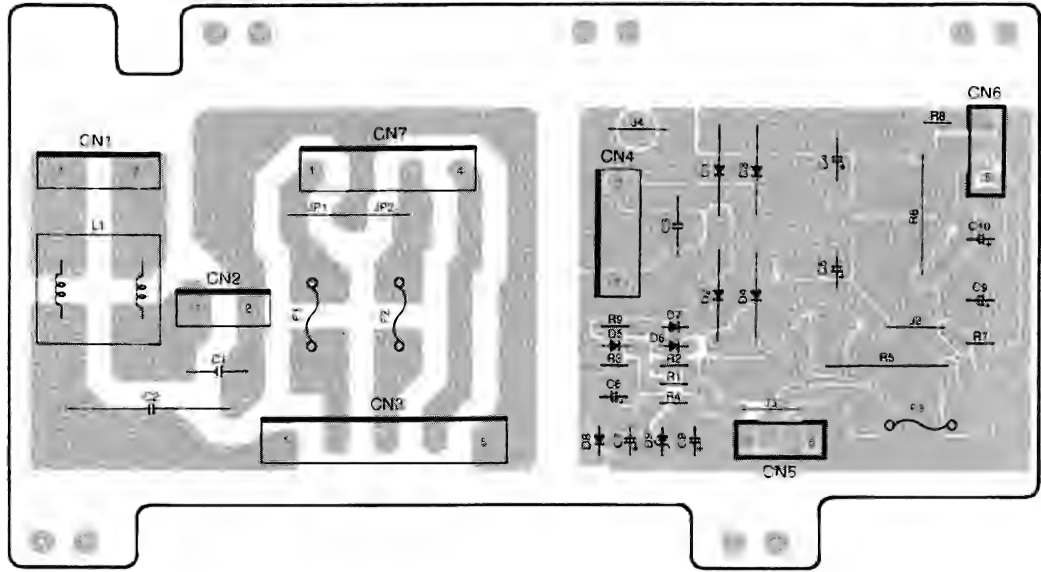
MAIN(SXPG223021)(FOIL SIDE)







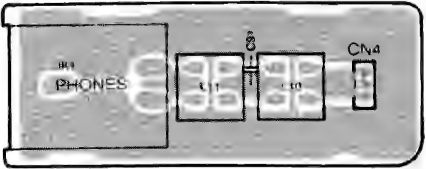
ACP **X XR XS XD XT** (SXPG223281A)  
**M MC XM** (SXPG223271A) Others(SXPG223251A)



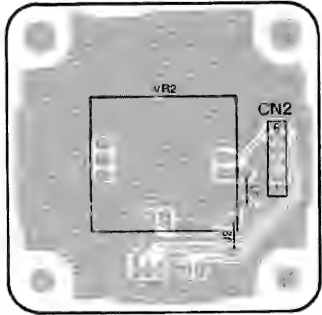
ACP P.C. Board

SXPG NO.	AREA	F1	F2	F3	CN7	JP1	JP2
223241A	<b>X XR XS XD XT</b>	XBA2C10TB0	XBA2C05TB0	XBA2C20TB0	○	×	×
223231A	<b>M MC XM</b>	XBA1C16NU100	×	XBA1C25NU100	×	○	×
223211A	Others	×	XBA2C05TB0	XBA2C20TB0	×	×	○

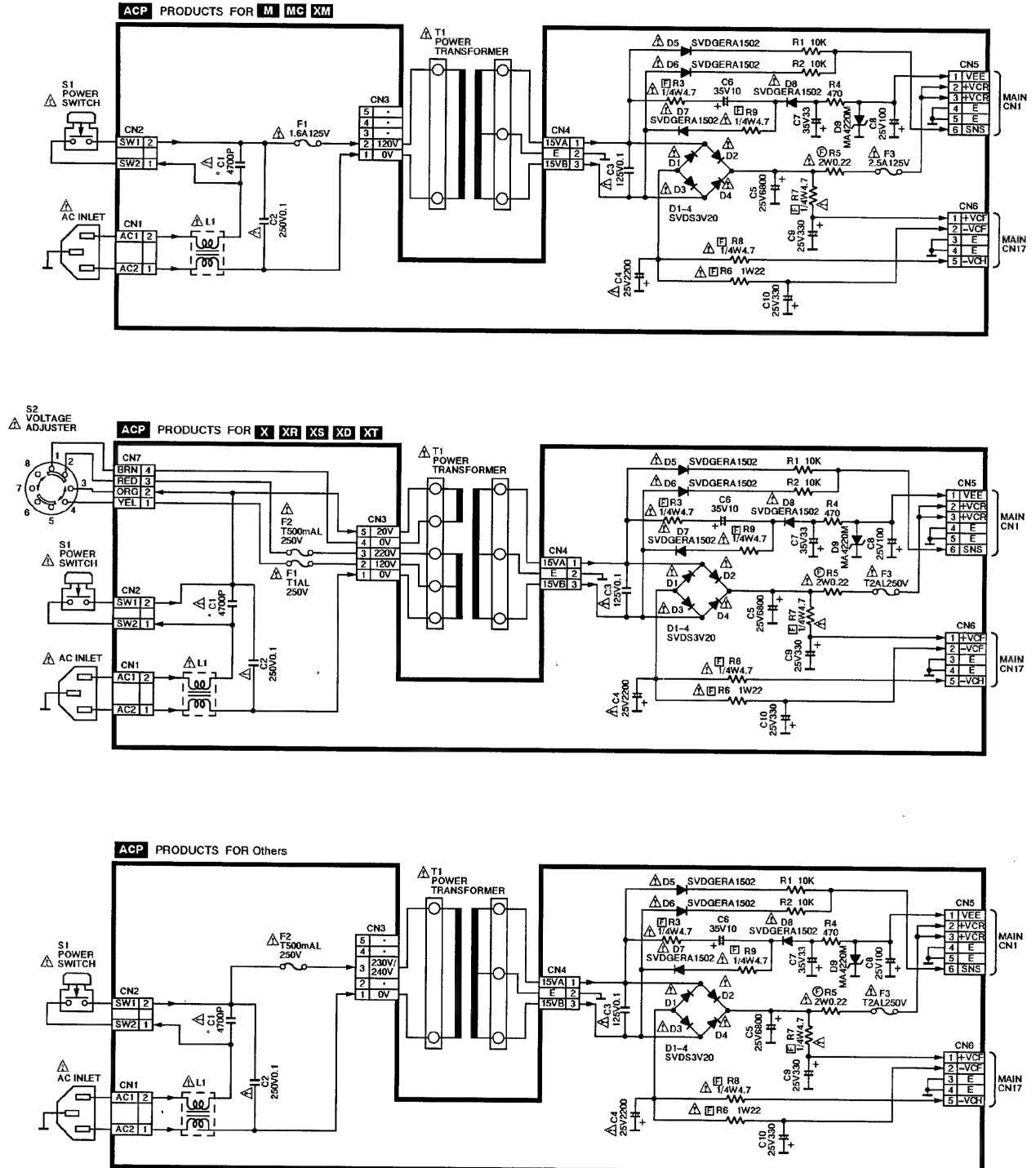
HP(SXPG225111C)



MB2(SXPG223221D)

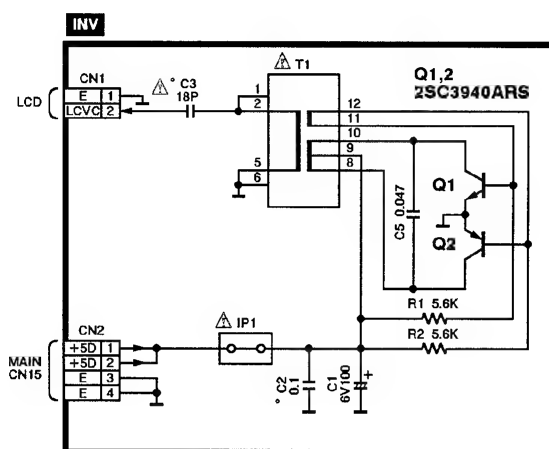


## ACP P.C. Diagram



A

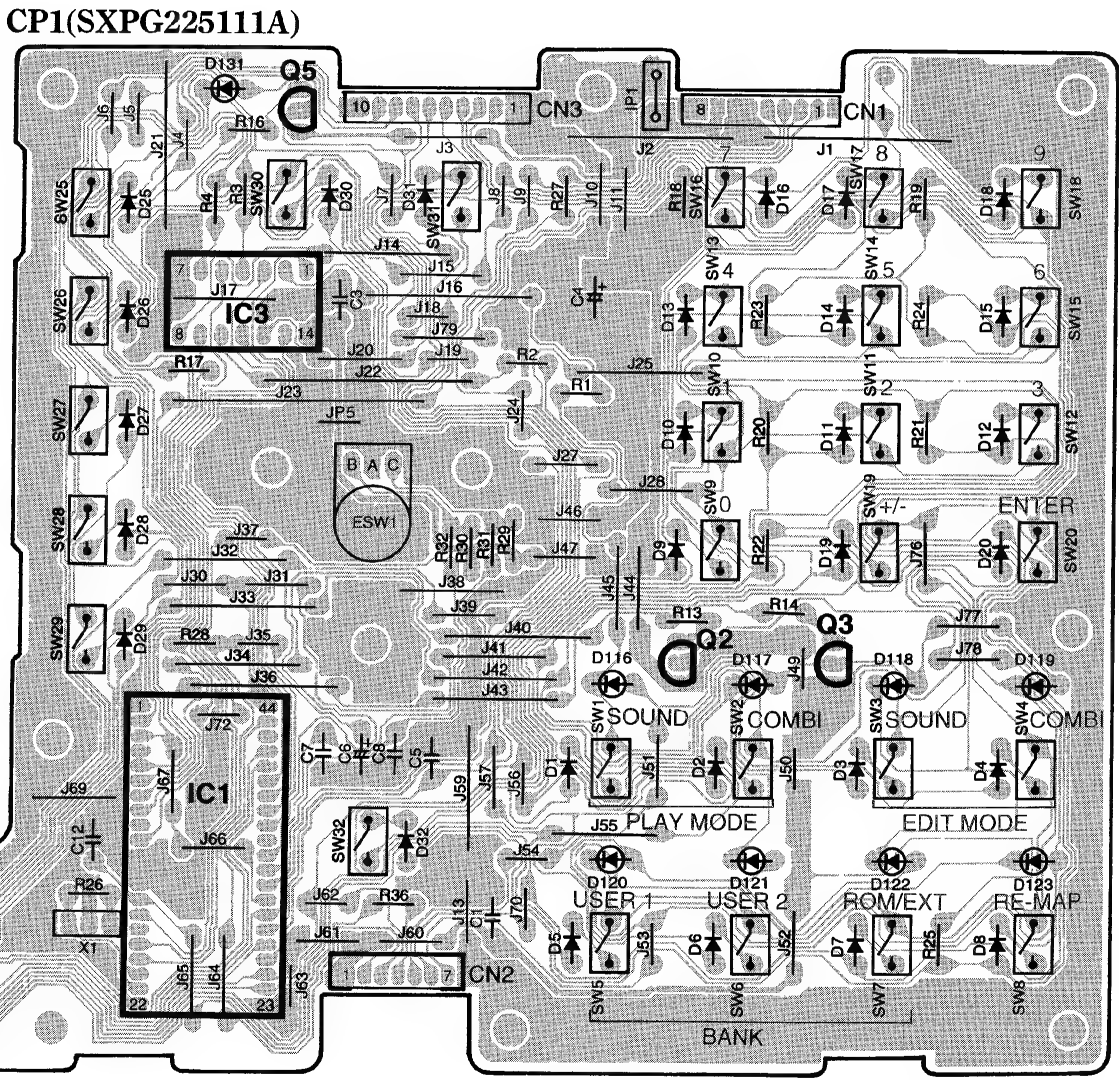
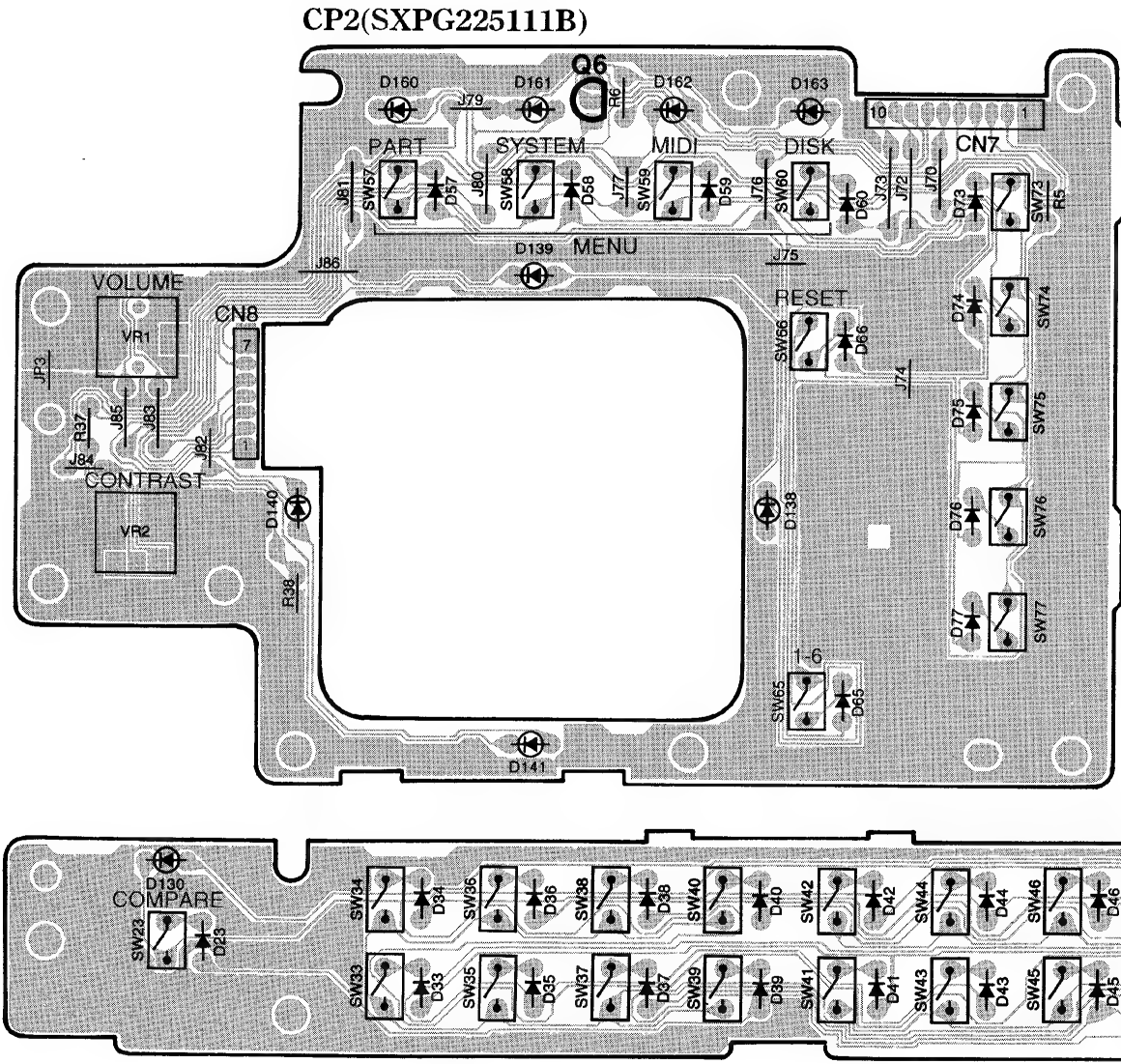
CNT



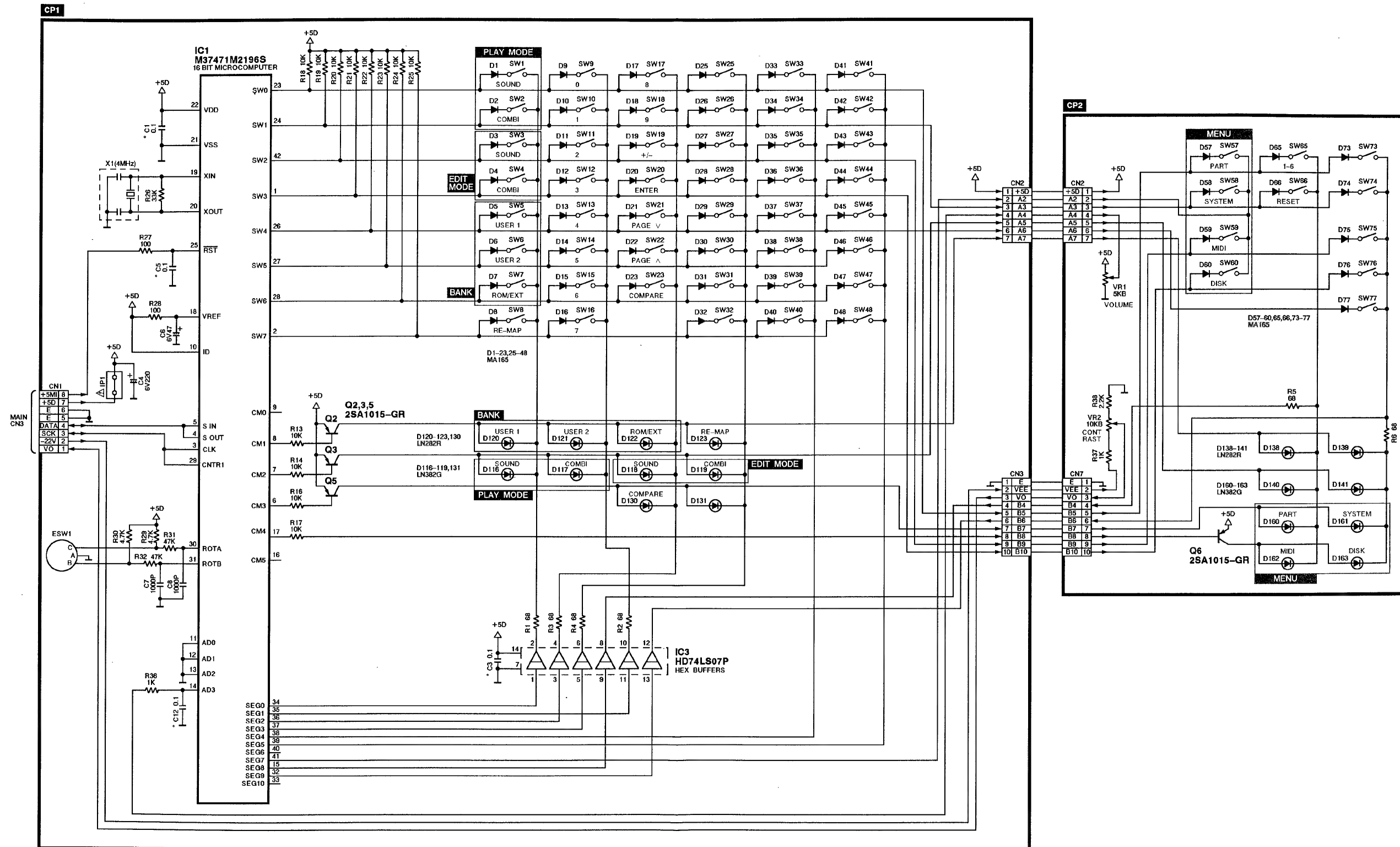


CP1/CP2 P.C. Board

F  
E  
D  
C  
B  
A



## CP1/CP2 P.C. Diagram





# REPLACEMENT PARTS LIST.....P.C.B. and Wiring Parts

## Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependant on the type of assembly, and in accordance with the laws governing part and product retention.  
After the end of this period, the assembly will no longer be available.

## 2. Important safety notice

Components identified by  $\Delta$  mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

3. The "S" mark is service standard parts and may differ from production parts.
4.  $\bigcirc$  mark are new parts.
5. For part No. with area mark, check the area when placing an order.

## PRINTED CIRCUIT BOARD

	RTL	Area	Part No.	Description	P/S
$\bigcirc$	RTL		SXPG223021	<b>MAIN</b>	1
$\bigcirc$	RTL		SXPG225111C	<b>HP</b>	1
$\bigcirc$	RTL		SXPG223221D	<b>MB2</b>	1
$\bigcirc$	RTL	<b>X XR XS XD</b>	SXPG223281A	<b>ACP</b>	1
		<b>XT</b>			
$\bigcirc$	RTL	<b>EN EK EZ EW</b>	SXPG223251A	<b>ACP</b>	1
		<b>EF EA EH EP</b>			
		<b>XL XP</b>			
$\bigcirc$	RTL	<b>M MC XM</b>	SXPG223271A	<b>ACP</b>	1
$\bigcirc$	RTL		SXPG223221B	<b>INV</b>	1
$\bigcirc$	RTL		SXPG225111A	<b>CP1</b>	1
$\bigcirc$	RTL		SXPG225111B	<b>CP2</b>	1
$\bigcirc$			QSLG018AA	<b>LCD</b>	1

	Ref. No.	Part No.	Description	P/S
	IC26	D74HC32GS	QUAD 2 INPUT OR GATE	1
	IC27	D74HC139GS	IC, CMOS LOGIC	1
	IC28	QSIGCWSA1CX	IC, 4M EPROM	1
	IC28-1	(M27C400210F1	(BLANK ROM)	1
	IC30	D6383GF-3BA	IC, MICROCONTROLLER, 16BIT	1
	IC31, 32	LC321664AJ80	1M BIT DYNAMIC RAM	2
	IC33, 34	M5M44260AJ7S	IC, D RAM 4M BIT	2
	IC37	TC7W08F	DUAL 2-INPUT AND GATES	1
	IC38	TC7S08F	IC, CMOS LOGIC	1
	IC39	TC7S14F	OR GATE	1
	IC40	T7WU04F	IC, CMOS LOGIC	1
	IC43	QSIGH3C16DT8	IC, MASK ROM 16M BIT	1
	IC44	QSIGH3C16EA0	IC, MASK ROM 16M BIT	1
	IC45	QSIGH3C16EA2	IC, MASK ROM 16M BIT	1
	IC47	QSIGH3C16DT7	IC, MASK ROM 16M BIT	1
	IC48	QSIGH3C16DT9	IC, MASK ROM 16M BIT	1
	IC49	QSIGH3C16EA1	IC, MASK ROM 16M BIT	1
	IC51	LC321664AJ80	1M BIT DYNAMIC RAM	1
	IC52~54	PCM1702U	D-A CONVERTER	3
	IC55~58	M5218AFP	OPERATIONAL AMPLIFIER	4
	IC59	PCM1702U	D-A CONVERTER	1
	IC60	T7WU04F	IC, CMOS LOGIC	1
	IC61	LC321664AJ80	1M BIT DYNAMIC RAM	1
	IC71	LH5P832N-10	256K BIT STATIC RAM	1
	IC100	BA10393F	COMPARATOR	1
	IC101	M5223FPEI	IC, LINER	1
	IC102	$\Delta$ M5F7805L	VOLTAGE REGULATOR	1
	IC103	$\Delta$ M5F7905L	-5V VOLTAGE REGULATOR	1

## MAIN MAIN CIRCUIT

	Ref. No.	Part No.	Description	P/S
<b>INTEGRATED CIRCUITS</b>				
	IC1, 2	TMP95C061AF	IC, MICROCONTROLLER, 16BIT	2
	IC3	L7A1429	IC, LSI	1
	IC4	TC183C230002	IC, MICROCONTROLLER, 8BIT	1
	IC5, 6	D6383GF-3BA	IC, MICROCONTROLLER, 16BIT	2
	IC7	SED1330FBA	LCD CONTROLLER	1
	IC8	D72070GF3BE	IC, MICROCONTROLLER, 8BIT	1
	IC9	TC7S14F	OR GATE	1
	IC10	QCPL-260L	PHOTO COUPLER	1
	IC12	QSIGCWSA1AX	IC, 4M EPROM	1
	IC12-1	(M27C400210F1	(BLANK ROM)	1
	IC13	QSIGCWSA1BX	IC, 4M EPROM	1
	IC13-1	(M27C400210F1	(BLANK ROM)	1
	IC14	M5256CFP70LL	IC, S RAM	1
	IC15	M5M44170AJ7S	IC, D RAM 4M BIT	1
	IC16	T7WU04F	IC, CMOS LOGIC	1
	IC17	D74HC139GS	IC, CMOS LOGIC	1
	IC18	D74HC138GS	IC, CMOS LOGIC	1
	IC19	TC7S08F	IC, CMOS LOGIC	1
	IC20	QCPL-260L	PHOTO COUPLER	1
	IC21	QSIGCWSA1DX	IC, 4M EPROM	1
	IC21-1	(M27C400210F1	(BLANK ROM)	1
	IC22	AM29F400T	IC, FLASH MEMORY 4M BIT	1
	IC23	LC321664AJ80	1M BIT DYNAMIC RAM	1
	IC24, 25	D74HC374GS	IC, CMOS LOGIC	2

<b>TRANSISTORS</b>				
	Q1	2SD601AQ	TRANSISTOR	1
	Q2~5	2SB709AR	TRANSISTOR	4
	Q6	2SD601AQ	TRANSISTOR	1
	Q7	2SB709AR	TRANSISTOR	1
	Q8, 9	2SD601AQ	TRANSISTOR	2
	Q10	2SB709AR	TRANSISTOR	1
	Q11	2SD601AQ	TRANSISTOR	1
	Q12~15	2SB709AR	TRANSISTOR	4
	Q16	2SD601AQ	TRANSISTOR	1
	Q17	$\Delta$ 2SA1643	TRANSISTOR	1
	Q18	2SD601AQ	TRANSISTOR	1
	Q19	2SB941P	TRANSISTOR	1
	Q20	2SD592ARS	TRANSISTOR	1
	Q21	2SB621ARS	TRANSISTOR	1
	Q22	2SD592ARS	TRANSISTOR	1
	Q23	2SB621ARS	TRANSISTOR	1
	Q24	2SC1815GR	TRANSISTOR	1
	Q25	2SB709AR	TRANSISTOR	1

Ref. No.	Part No.	Description	P/S	Ref. No.	Part No.	Description	P/S
<b>DIODES</b>							
D1~5, 8~14	MA110	DIODE	12	R26	ERJ6GEYJ102V	1KΩ	1
D15	MA8082M	DIODE, SI	1	R28, 29	ERJ6GEYJ221V	220Ω	2
D16	MA8056L	DIODE, SI	1	R30	ERJ6GEYJ102V	1KΩ	1
D17	△ SVDGERC9102	DIODE	1	R31	ERJ6GEYJ221V	220Ω	1
D18	△ MA2062LF	ZENER, 6.2V	1	R33	ERJ6GEYJ104V	100KΩ	1
D19	MA151WK	DIODE	1	R34	ERJ6GEYJ102V	1KΩ	1
D20, 21	MA110	DIODE	2	R35	ERJ6GEYJ222V	2.2KΩ	1
D22	MA151WK	DIODE	1	R36	ERJ6GEYJ102V	1KΩ	1
D25, 26	MA110	DIODE	2	R37	ERJ6GEYJ474V	470KΩ	1
D27	EK04	DIODE	1	R38	ERJ6GEYJ221V	220Ω	1
D28	MA8030L	ZENER, 3.1V	1	R39~42	ERJ6GEYJ472V	4.7KΩ	4
D29	MA110	DIODE	1	R43, 44	ERJ6GEYJ103V	10KΩ	2
D30, 31	MA1062M	ZENER, 6.2V	2	R45, 46	ERJ6GEYJ472V	4.7KΩ	2
				R47~49	ERJ6GEYJ221V	220Ω	3
<b>OSCILLATORS</b>				R50	ERJ6GEYJ333V	33KΩ	1
X1	QXSG2F2800A	CERAMIC OSCILLATOR	1	R51	ERJ6GEYJ473V	47KΩ	1
X2	EF0EC8004A5	8MHz, CERAMIC OSCILLATOR	1	R52	ERJ6GEYJ221V	220Ω	1
X3	QXSG1A2500A	25MHz, QUARTZ OSCILLATOR	1	R53	ERJ6GEYJ104V	100KΩ	1
X4	QXSG1I3386A	CRYSTAL OSCILLATOR	1	R54	ERJ6GEYJ103V	10KΩ	1
X5	QXSG2F2400A	CERAMIC OSCILLATOR	1	R55	ERJ6GEYJ682V	6.8KΩ	1
				R56	ERJ6GEYJ102V	1KΩ	1
<b>COMPONENT COMBINATIONS</b>				R57~61	ERJ6GEYJ103V	10KΩ	5
Z1~4	EXBS8V103J	10KΩ × 4	4	R62	ERJ6GEYJ102V	1KΩ	1
Z5	EXBV8V221J	220Ω × 4	1	R63	ERJ6GEYJ151V	150Ω	1
Z6	EXBV8V471J	470Ω × 4	1	R64~66	ERJ6GEY0R00V	0Ω	3
Z7	EXBS8V102J	1KΩ × 4	1	R67	ERJ6GEYJ221V	220Ω	1
Z10~13	EXBS8V103J	10KΩ × 4	4	R68	ERJ6GEYJ330V	33Ω	1
Z18~24	EXBV8V470J	47Ω × 4	7	R69, 70	ERJ6GEYJ680V	68Ω	2
Z25, 26	EXBS8V470J	47Ω × 4	2	R71	ERJ6GEYJ151V	150Ω	1
Z27~29	EXBV8V102J	1KΩ × 4	3	R72	ERJ6GEYJ331V	330Ω	1
Z30~36	EXBV8V470J	47Ω × 4	7	R73	ERJ6GEYJ224V	220KΩ	1
Z37~47, 49	EXBV8V471J	470Ω × 4	12	R74	ERJ6GEYJ102V	1KΩ	1
Z50, 51	EXBS8V103J	10KΩ × 4	2	R75	ERJ6GEYJ104V	100KΩ	1
Z52~55	EXBV8V221J	220Ω × 4	4	R76	ERJ6GEYJ103V	10KΩ	1
				R77	ERJ6GEYJ221V	220Ω	1
<b>COILS</b>				R78	ERJ6GEYJ104V	100KΩ	1
L1, 2, 5~7	QLQGT3T150SA	15μH × 3	5	R79	ERJ6GEYJ472V	4.7KΩ	1
L8	SLCG3A121T	120μH	1	R81	ERG1SJ331	330Ω, 1W, FLAME TYPE	1
L9	QLBG002A	0.45μH	1	R82	ERJ6GEYJ331V	330Ω	1
L10	QLQGT1B800MA	80μH	1	R83	ERJ6GEYJ101V	100Ω	1
				R84	ERJ6GEYJ221V	220Ω	1
<b>JACKS</b>				R85	ERJ6GEYJ471V	470Ω	1
JK1~3	QJJG005AA	JACK SOCKET	3	R86	ERJ6GEYJ683V	68KΩ	1
JK8~11	QJJG003AA	JACK	4	R87	ERJ6GEYJ221V	220Ω	1
				R88	ERJ6GEYJ472V	4.7KΩ	1
<b>RESISTORS</b>				R89	ERJ6GEYJ221V	220Ω	1
R1	ERJ6GEYJ221V	220Ω	1	R90, 91	ERJ6GEYJ122V	THICK FILM CHIP RESISTOR, 1/10W	2
R2	ERJ6GEYJ330V	33Ω	1	R92	ERJ6GEYF102V	THICK FILM CHIP RESISTOR, 1/10W	1
R3	ERJ6GEYJ680V	68Ω	1	R93	ERJ6GEYJ101V	100Ω	1
R4	ERJ6GEYJ102V	1KΩ	1	R94	ERJ6GEYJ152V	1.5KΩ	1
R5	ERJ6GEYJ151V	150Ω	1	R95~97	ERJ6GEYJ101V	100Ω	3
R6	ERJ6GEYJ331V	330Ω	1	R98	ERJ6GEYJ472V	4.7KΩ	1
R7	ERJ6GEYJ224V	220KΩ	1	R99	ERJ6GEYJ221V	220Ω	1
R8	ERJ6GEYJ104V	100KΩ	1	R100	ERJ6GEYJ102V	1KΩ	1
R9	ERJ6GEYJ103V	10KΩ	1	R101	ERJ6GEYJ104V	100KΩ	1
R10	ERJ6GEYJ102V	1KΩ	1	R102	ERJ6GEYJ101V	100Ω	1
R11	ERJ6GEYJ680V	68Ω	1	R103	ERJ6GEYJ221V	220Ω	1
R12, 20	ERJ6GEYJ104V	100KΩ	2	R104~107	ERJ6GEYJ102V	1KΩ	4
R21	ERJ6GEYJ221V	220Ω	1	R108~110	ERJ6GEYJ221V	220Ω	3
R22	ERJ6GEYJ103V	10KΩ	1	R111	ERJ6GEYJ101V	100Ω	1
R23~25	ERJ6GEYJ101V	100Ω	3	R112	ERJ6GEYJ471V	470Ω	1
				R113	ERJ6GEYJ221V	220Ω	1
				R114, 115	ERJ6GEYJ471V	470Ω	2
				R116~118	ERJ6GEYJ103V	10KΩ	3
				R119	ERJ6GEYJ682V	6.8KΩ	1
				R120	ERJ6GEYJ104V	100KΩ	1
				R121	ERJ6GEYJ124V	120KΩ	1
				R122	ERJ6GEYJ330V	33Ω	1

Ref. No.	Part No.	Description	P/S	Ref. No.	Part No.	Description	P/S
R123	ERJ6GEYJ102V	1KΩ	1	C72	ECUV1C104KBX	CERAMIC CAPACITOR, MULTI LAYER	1
R124	ERJ6GEYJ682V	6.8KΩ	1	C73, 74	ECUV1H100DCN	10pF	2
R125	ERJ6GEYJ104V	100KΩ	1	C75~77	ECUV1H104ZFX	0.1μF	3
R126	ERJ6GEYJ124V	120KΩ	1	C78, 79	ECUV1H100DCN	10pF	2
R127	ERJ6GEYJ330V	33Ω	1	C80	ECUV1H104ZFX	0.1μF	1
R128	ERJ6GEYJ102V	1KΩ	1	C83	ECUV1H333KBX	0.033μF	1
R129, 130	△ ERG1SJ330	33Ω, 1W	2	C84	ECUV1H104ZFX	0.1μF	1
R131, 132	ERJ6GEYJ681V	680Ω	2	C85	ECUV1H472KBG	0.0047μF	1
R133, 134	ERJ6GEYJ103V	10KΩ	2	C86	ECUV1H223KBX	0.022μF	1
R135	ERJ6GEYJ682V	6.8KΩ	1	C87	ECUV1H182JX	MULTILAYER CERAMIC CHIP CAPACITOR	1
R136	ERJ6GEYJ105V	1MΩ	1	C88	ECEA1HKA010	1μF, 50V	1
R137	ERJ6GEYJ104V	100KΩ	1	C89, 90	ECUV1H104ZFX	0.1μF	2
R138	ERJ6GEYJ124V	120KΩ	1	C91	ECQV1H104JM	0.1μF	1
R139	ERJ6GEYJ681V	680Ω	1	C92, 93	ECUV1H221JG	220pF	2
R140	ERJ6GEYJ103V	10KΩ	1	C94~98	ECUV1H104ZFX	0.1μF	5
R141	ERJ6GEYJ682V	6.8KΩ	1	C99	ECEA1CKA101	100μF, 16V	1
R142, 143	ERJ6GEYJ104V	100KΩ	2	C101	ECUV1H104ZFX	0.1μF	1
R144	ERJ6GEYJ124V	120KΩ	1	C102~104	ECRF1H104ZF	0.1μF	3
R145	ERJ6GEYJ681V	680Ω	1	C105	ECUV1H104ZFX	0.1μF	1
R146	ERJ6GEYJ104V	100KΩ	1	C107	ECEA1CKA100	10μF, 16V	1
R147, 148	ERJ6GEYJ152V	1.5KΩ	2	C109	ECUV1H103KBG	0.01μF	1
R149, 150	ERJ6GEYJ102V	1KΩ	2	C110	ECEA0JU102	1000μF, 6.3V	1
R151~155	ERJ6GEY0R00V	0Ω	5	C111~113	ECUV1H104ZFX	0.1μF	3
R156	ERJ6GEYJ102V	1KΩ	1	C114	ECEA0JKA470	47μF 6.3V	1
R157	ERJ6GEYJ471V	470Ω	1	C115	EECS5R5V105	1F, 5.5V, MEMORY BACK-UP	1
R158~160	ERJ6GEYJ470V	47Ω	3	C116	ECEA1CKA100	10μF16V	1
R161	ERJ6GEYJ103V	10KΩ	1	C117	EECS5R5V105	1F, 5.5V, MEMORY BACK-UP	1
R162~164	ERJ6GEYJ102V	1KΩ	3	C118~126	ECUV1H104ZFX	0.1μF	9
R165	ERJ6GEYJ470V	47Ω	1	C127, 128	ECUV1H060DCN	6pF	2
R166, 167	ERJ6GEYJ102V	1KΩ	2	C129~143	ECUV1H104ZFX	0.1μF	15
R168	ERJ6GEYJ103V	10KΩ	1	C144	ECUV1H470JG	47pF	1
R169, 170	ERJ6GEYJ102V	1KΩ	2	C145	ECUV1H104ZFX	0.1μF	1
R171, 172	ERJ6GEYJ471V	470Ω	2	C146	ECEA0JU102	1000μF, 6.3V	1
R173, 174	ERJ6GEYJ104V	100KΩ	2	C147~149	ECUV1H104ZFX	0.1μF	3
R175	ERJ6GEYJ102V	1KΩ	1	C150	ECEA0JKA470	47μF, 6.3V	1
R176	ERJ6GEYJ471V	470Ω	1	C151	ECUV1H102JX	0.001μF	1
R177, 178	ERJ6GEYJ103V	10KΩ	2	C152	ECUV1H100DCN	10pF	1
R179~183	ERJ6GEYJ102V	1KΩ	5	C153~156	ECUV1H104ZFX	0.1μF	4
R184	ERJ6GEYJ471V	470Ω	1	C157, 158	ECRF1H104ZF	0.1μF	2
R186	ERJ6GEYJ221V	220Ω	1	C159	ECUV1H102JX	0.001μF	1
R188	ERJ6GEYJ471V	470Ω	1	C160	ECUV1H100DCN	10pF	1
R189	ERJ6GEYJ102V	1KΩ	1	C161	ERJ6GEY0R00V	0Ω	1
R190, 191	ERJ6GEYJ221V	220Ω	2	C162~165	ECUV1H104ZFX	0.1μF	4
R192	ERJ6GEYJ471V	470Ω	1	C166, 167	ECUV1H102JX	0.001μF	2
R200~204, 208~210, 301	ERJ6GEY0R00V	0Ω	9	C168~171	ECUV1H104ZFX	0.1μF	4
<b>CAPACITORS</b>				C172	ECRF1H104ZF	0.1μF	1
C1~8	ECUV1H104ZFX	0.1μF	8	C173	ECQV1H104JM	0.1μF	1
C9	ECUV1H332KB	0.0033μF	1	C174, 175	ECUV1H470JG	47pF	2
C10~29, 31~34, 36	ECUV1H104ZFX	0.1μF	25	C176, 177	ECEA1CKN100	10μF, 16V	2
C37	ECUV1H333KBX	0.033μF	1	C178, 179	ECUV1H103KBG	0.01μF	2
C39	ECUV1H221JG	220pF	1	C181, 182	ECUV1H222KX	0.0022μF	2
C43~49	ECUV1H104ZFX	0.1μF	7	C183	ECUV1H104ZFX	0.1μF	1
C50	ECUV1E224ZFX	0.22μF	1	C184, 185	ECUV1H222KX	0.0022μF	2
C51~54	ECUV1H104ZFX	0.1μF	4	C186	ECUV1H104ZFX	0.1μF	1
C55, 56	ECRF1H104ZF	0.1μF	2	C187	ECUV1H220JCN	22pF	1
C57	ECQV1H104JM	0.1μF	1	C188	ECUV1C224KBX	CERAMIC CAPACITOR, MULTI LAYER	1
C58	ECRF1H104ZF	0.1μF	1	C189	ECQV1H104JM	0.1μF	1
C60, 61	ECUV1H104ZFX	0.1μF	2	C190	ECUV1H101JG	100pF	1
C63, 64	ECUV1H101JG	100pF	2	C191, 192	ECEA1CKN100	10μF, 16V	2
C65	ECUV1H333KBX	0.033μF	1	C194	ECUV1H221JG	220pF	1
C66~69	ERJ6GEY0R00V	0Ω	4	C195, 196	ECUV1H104ZFX	0.1μF	2
C70	ECUV1H103KBG	0.01μF	1	C198, 199	ECUV1H221JG	220pF	2
C71	ECUV1H104ZFX	0.1μF	1	C200	ECUV1H470JG	47pF	1
				C201~212	ECUV1H104ZFX	0.1μF	12
				C213, 214	ECUV1E224ZFX	0.22μF	2
				C216~219	ECEA1HKN010	1μF, 50V	4
				C220	ECUV1H101JG	100pF	1
				C221	ECEA1EKA100	10μF, 25V	1

Ref. No.	Part No.	Description	P/S
C222~225, 227, 228	ECUV1H104ZFX	0.1μF	6
C229-231	ECUV1H100DCN	10pF	3

## HP HEADPHONES CIRCUIT

Ref. No.	Part No.	Description	P/S
<b>COILS</b>			
L10, 11	QLQGT3T150SA	15μHX3	2
<b>JACK</b>			
JK1	SJJG100A	JACK	1
<b>CAPACITOR</b>			
C91	ECRF1H104ZF	0.1μF	1

## MB2 MODULATION BALL 2 CIRCUIT

Ref. No.	Part No.	Description	P/S
<b>VARIABLE RESISTOR</b>			
VR2	QRVG22B01B54	VARIABLE RESISTOR	1

## ACP AC POWER SUPPLY CIRCUIT

Ref. No.	Part No.	Description	P/S
<b>DIODES</b>			
D1~4	SVDS3V20	RECTIFIER	4
D5~8	SVDGERA1502	RECTIFIER	4
D9	MA4220M	ZENER, 22V	1
<b>LINE FILTER</b>			
L1	SLTGLF3	LINE FILTER	1
<b>FUSES</b>			
F1	XBA1C16NU100	1.6A, 125V, M MC XM	1
F1	XBA2C10TB0	T1.0A, 250V, X XR XS XD XT	1
F2	XBA2C05TB0	T500mA, 250V, EN EK EZ EW EF EA EH EP XL XP X XR XS XD XT	1
F3	XBA2C20TB0	T2A, 250V, EN EK EZ EW EF EA EH EP XL XP X XR XS XD XT	1
F3	XBA1C25NU100	2.5A, 125V, M MC XM	1

Ref. No.	Part No.	Description	P/S
<b>RESISTORS</b>			
R1, 2	ERDS2TJ103	10KΩ	2
R3	ERD2FCVJ4R7	4.7Ω, 1/4W, FUSE TYPE	1
R4	ERDS2TJ471	470Ω	1
R5	ERX2ANJPR22S	0.22Ω, 2W, FLAME-PROOF	1
R6	ERQ1CJP220S	FUSE RESISTOR, 1W	1
R7~9	ERD2FCVJ4R7	4.7Ω, 1/4W, FUSE TYPE	3
<b>CAPACITORS</b>			
C1	ECKCVA1472MF	4700pF, LINE CAPACITOR	1
C2	ECQU2A104MT	0.1μF, 250V, ACROSS-THE LINE CAPACITOR	1
C3	ECQE1A104M6	0.1μF, 125V	1
C4	ECEA1EU222	2200μF, 25V	1
C5	ECA1EM682E	6800μF, 25V	1
C6	ECEA1VKA100	10μF, 35V	1
C7	ECEA1VKA330	33μF, 35V	1
C8	ECEA1EU101	100μF, 25V	1
C9, 10	ECA1EM331	ALUMINIUM CAPACITOR	2

## INV INVERTER CIRCUIT

Ref. No.	Part No.	Description	P/S
<b>TRANSISTORS</b>			
Q1, 2	2SC3940ARS	TRANSISTOR	2
<b>TRANSFORMER</b>			
T1	QTDG003A	TRANSFORMER	1
<b>IC PROTECTOR</b>			
IP1	ICP-N10T104	IC PROTECTOR	1
<b>RESISTORS</b>			
R1, 2	ERDS2TJ562	5.6KΩ	2
<b>CAPACITORS</b>			
C1	ECEA0JKA101	100μF, 6.3V	1
C2	ECRF1H104ZF	0.1μF	1
C3	ECCD3F180JGE	18pF	1
C5	ECHS1473JZW	0.047μF	1

## CP1 CONTROL PANEL 1 CIRCUIT

Ref. No.	Part No.	Description	P/S
<b>INTEGRATED CIRCUITS</b>			
IC1	M37471M2196S	16 BIT MICROCOMPUTER	1
IC3	HD74LS07P	HEX BUFFERS	1
<b>TRANSISTORS</b>			
Q2, 3, 5	2SA1015-GR	2SA933STRS (SUB. PART)	3

Ref. No.	Part No.	Description	P/S
<b>DIODES</b>			
D1~23, 25~48	MA165	DIODE	47
D116~119, 131	LN382G	LED (GREEN)	5
D120~123, 130	LN282R	LED (RED)	5
<b>OSCILLATOR</b>			
X1	EF0EC4004A3	4MHz, CERAMIC OSCILLATOR	1
<b>SWITCHES</b>			
ESW1	QSRGT002AA	ENCODER SWITCH	1
S1~23, 25~48	EVQ21507K	PUSH SWITCH	47
<b>IC PROTECTOR</b>			
IP1	△ ICP-N10T104	IC PROTECTOR	1
<b>RESISTORS</b>			
R1~4	ERDS2TJ680	68Ω	4
R13, 14, 16~25	ERDS2TJ103	10KΩ	12
R26	ERDS2TJ333	33KΩ	1
R27, 28	ERDS2TJ101	100Ω	2
R29, 30	ERDS2TJ472	4.7KΩ	2
R31, 32	ERDS2TJ473	47KΩ	2
R36	ERDS2TJ102	1KΩ	1
<b>CAPACITORS</b>			
C1, 3	ECRF1H104ZF	0.1μF	2
C4	ECEA0JKA221	220μF, 6.3V	1
C5	ECRF1H104ZF	0.1μF	1
C6	ECEA0JKA470	47μF, 6.3V	1
C7, 8	ECBA1H102KB	0.001μF	2
C12	ECRF1H104ZF	0.1μF	1

## CP2 CONTROL PANEL 2 CIRCUIT

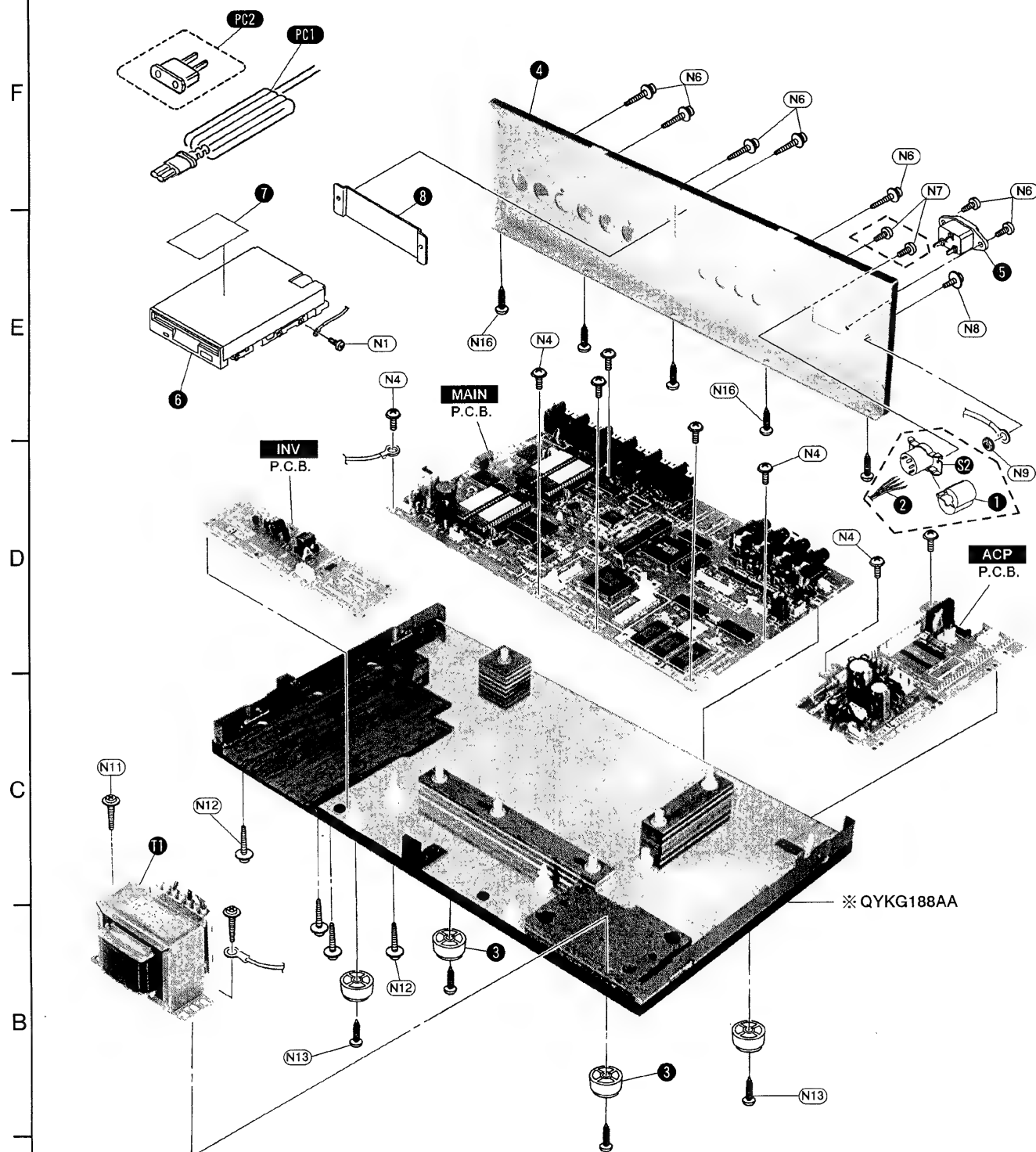
Ref. No.	Part No.	Description	P/S
<b>TRANSISTOR</b>			
S Q6	2SA1015-GR	2SA933STRS (SUB. PART)	1
<b>DIODES</b>			
D57~60, 65, 66, 73~77	MA165	DIODE	11
D138~141	LN282R	LED (RED)	4
D160~163	LN382G	LED (GREEN)	4
<b>SWITCHES</b>			
S57~60, 65, 66, 73~77	EVQ21507K	PUSH SWITCH	11
<b>VARIABLE RESISTORS</b>			
○ VR1	EVUF2JFK3B53	VARIABLE RESISTOR, 0.05W	1
○ VR2	EVUF2AE20B14	VARIABLE RESISTOR, 0.05W	1

Ref. No.	Part No.	Description	P/S
<b>RESISTORS</b>			
R5, 6	ERDS2TJ680	68Ω	2
R37	ERDS2TJ102	1KΩ	1
R38	ERDS2TJ222	2.2KΩ	1

## ■ WIRING PARTS

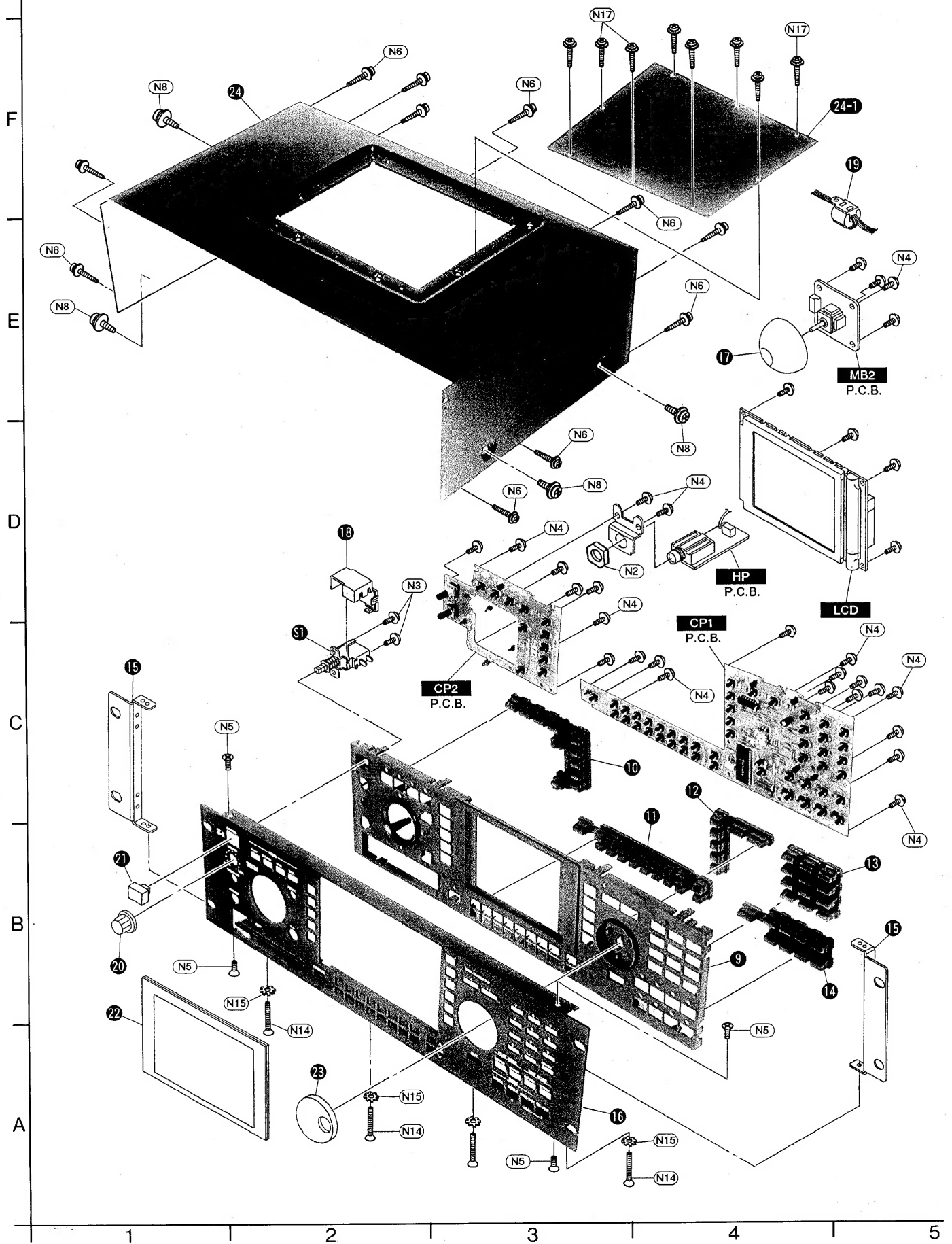
Ref. No.	Part No.	Description	P/S
W1	△ QEXGVH03055B	CONNECTOR WITH WIRE	1
W2	△ QEXGVH04010B	COMMU CABLE W/OUT PLUG	1
○ W3	△ QEXGVH07015C	COMMU CABLE W/OUT PLUG, <b>X XR XS XD XT</b>	1
W4	△ QEXGSS06050A	CONNECTOR WITH WIRE	1
○ W5	△ QEXGST03060A	COMMU CABLE W/OUT PLUG	1
W6	△ QEXGZA34015A	COMMU CABLE W/OUT PLUG	1
○ W7	△ QEXGZA14045B	COMMU CABLE W/OUT PLUG	1
○ W8	△ QEXGSS04015A	COMMU CABLE W/OUT PLUG	1
○ W9	△ QEXGSA06020A	COMMU CABLE W/OUT PLUG	1
○ W10	△ QEXGSA08055A	COMMU CABLE W/OUT PLUG	1
○ W11	△ QEXGST05025A	COMMU CABLE W/OUT PLUG	1
○ W12	△ QEXGSA10026A	COMMU CABLE W/OUT PLUG	1
○ W13	△ QEXGSA07040A	COMMU CABLE W/OUT PLUG	1
○ W14	△ QEXGXH04012A	COMMU CABLE W/OUT PLUG	1

# CABINET PARTS LOCATION (A)



**Note:** The marking (※) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time.

# CABINET PARTS LOCATION (B)



# REPLACEMENT PARTS LIST.....Cabinet and Chassis Parts

## Notes:

- The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependant on the type of assembly, and in accordance with the laws governing part and product retention.  
After the end of this period, the assembly will no longer be available.
- mark are new parts.

## 3. Important safety notice

Components identified by **△** mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

- For part No. with area mark, check the area when placing an order.

## 5. The raw material indication for synthetic resin

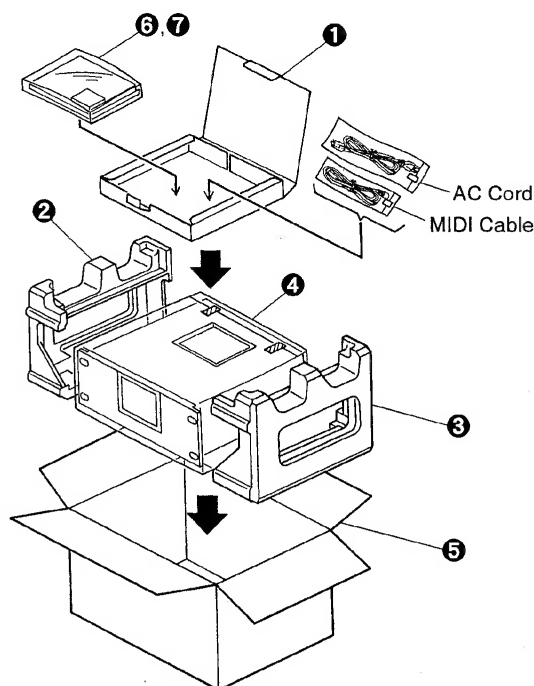
In order to facilitate classification of parts of synthetic resin manufacture and to promote the recycling of natural resources, a raw material symbol for such parts is indicated in the Ref. No./Material column.

## ■ CABINET & CHASSIS PARTS

Ref. No.	Part No.	Description	P/S	Ref. No.	Part No.	Description	P/S
<b>SWITCHES</b>							
S1	△ ESB8273V	POWER SWITCH	1	○ 11	QGUG1424AAK	PUSH BUTTON	1
S2	△ ESE37209	VOLTAGE SELECTOR, <b>X XR XS XD XT</b>	1	○ 12	QGUG1425AAK	PUSH BUTTON	1
<b>TRANSFORMER</b>				○ 13	QGUG1426AAK	PUSH BUTTON	1
T1	△ QTPG1M036A	POWER TRANSFORMER, <b>EN EK EZ EW EF EA EH EP</b> <b>XL XP</b>	1	○ 14	QGUG1427AAK	PUSH BUTTON	1
T1	△ QTPG1M035A	POWER TRANSFORMER, <b>M MC XM</b>	1	○ 15	QMAG0170AA	PLATE, STEEL	2
T1	△ QTPG1M037A	POWER TRANSFORMER, <b>X XR XS XD XT</b>	1	○ 16	QGPG0111AA	FRONT PANEL	1
<b>POWER CORD &amp; PLUG</b>				○ 17	<b>ABS</b> QGUG3008AA	BALL	1
PC1	△ QJAG018AA	POWER CORD W/PLUG, 240V, <b>EN EK EZ EF EA EH EP X XS</b> <b>XD XT XP</b>	1	18	SHRG8390A	COVER, POWER SW	1
PC1	△ QJAG020AA	POWER CORD W/PLUG, 240V, <b>EK</b>	1	19	△ QLZG005A	CORE	1
PC1	△ QJAG021AA	POWER CORD W/PLUG, 240V, <b>EW</b>	1	20	SBNG4010A	VOLUME KNOB	1
PC1	△ QJAG019AA	POWER CORD W/PLUG, 240V, <b>XL XR</b>	1	21	SBCG110B	BUTTON, POWER SWITCH	1
PC1	△ SJAG44	POWER CORD W/PLUG, 120V, <b>M MC XM</b>	1	○ 22	QKWG026AA	PLATE	1
PC2	△ SJP5213-1	ATTACHMENT PLUG, <b>X XT XP</b>	1	23	<b>ABS</b> QGUG3002BB	DIAL WHEEL	1
<b>CABINET PARTS</b>				○ 24	QKSGA003AA	TOP PANEL ASS'Y	1
○ 1	SUV453	SWITCH COVER, <b>X XR XS XD XT</b>	1	○ 24-1	[QMAG0152AA	LID	1
○ 2	△ QEXGVH07015C	COMMU CABLE W/OUT PLUG, <b>X XR XS XD XT</b>	1	<b>SCREWS &amp; WASHERS</b>			
3	SHRG2160A	LEG	4	N1	XYN3+F8	SCREW WITH WASHER	1
○ 4	QGKG0128AA	REAR PANEL, <b>X XR XS XD XT</b>	1	N2	XNS12FZ	NUT	1
○ 4	QGKG0128BA	REAR PANEL, <b>EN EK EZ EW EF EA EH EP</b> <b>XL XP M MC XM</b>	1	N3	XTB3+10B	SCREW	2
5	△ SJSG460A	PLUG	1	N4	XTW3+10Q	SCREW	30
6	△ QAUG012AA	DDR DRIVE UNIT	1	○ N5	XTS3+8JFZ	SCREW	4
7	QMRG2023AA	FELT	1	○ N6	XYA3+DJ10FZ	SCREW W/WASHER	18
8	QGKG0126AA	LID	1	N7	XYN3+F10FZ	SCREW WITH WASHER, <b>X XR XS XD XT</b>	2
○ 9	<b>PS</b> QGPG0112AA	PLATE, PS	1	N8	XYN4+F10FZ	SCREW WITH WASHER	5
○ 10	QGUG1423AAK	PUSH BUTTON	1	N9	SNE499-1	NUT	1
				N11	XYN4+F12	SCREW WITH WASHER	2
				N12	XYN3+F10FZ	SCREW WITH WASHER	4
				N13	XTB3+12AFZ	SCREW	4
				○ N14	XSS3+20FZ	SCREW	4
				○ N15	XWC3DFZ	WASHER	4
				N16	XTB35+10AFZ	SCREW	5
				N17	XTB3+8JFZ	SCREW	6



# PACKING



## ■ PACKING PARTS

Ref. No.	Part No.	Description	P/S	Ref. No.	Part No.	Description	P/S
<b>PACKING PARTS</b>							
1	QPGG0341AA	PACKING CASE, PAPER	1	7	QQFGWSA1FA	OPERATING INSTRUCTION MANUAL, <b>EA</b>	1
2	QPNG0567AA	PAD, PS	1	7-1	QQTG0368A	DEUTSCH	1
3	QPNG0568AA	PAD, PS	1	7-2	QQTG0369A	DEUTSCH	1
4	QPHG083AA	BAG, POLYETHYLENE	1	7	QQFGWSA1GA	OPERATING INSTRUCTION MANUAL, <b>EW</b>	1
5	QPGG0340AA	PACKING CASE, PAPER	1	7-1	QQTG0366A	FRANCAIS	1
6	QFVG2013A	DEMO DISK	1	7-2	QQTG0368A	DEUTSCH	1
				7-3	QQTG0367A	FRANCAIS	1
				7-4	QQTG0369A	DEUTSCH	1
				7-5	QQTG0370A	ITALIANO	1
				7-6	QQTG0361A	ENGLISH	1
				7	QQFGWSA1HA	OPERATING INSTRUCTION MANUAL, <b>EF</b>	1
				7-1	QQTG0366A	FRANCAIS	1
				7-2	QQTG0370A	ITALIANO	1
				7-3	QQTG0367A	FRANCAIS	1
				7-4	QQTG0361A	ENGLISH	1
				7	QQFGWSA1JA	OPERATING INSTRUCTION MANUAL, <b>EH</b>	1
				7-1	QQTG0368A	DEUTSCH	1
				7-2	QQTG0371A	NERDERLANDS	1
				7-3	QQTG0369A	DEUTSCH	1
				7-4	QQTG0361A	ENGLISH	1
				7-5	QQTG0366A	FRANCAIS	1
				7-6	QQTG0367A	FRANCAIS	1
				7	QQFGWSA1KA	OPERATING INSTRUCTION MANUAL, <b>EZ</b>	1
				7-1	QQTG0368A	DEUTSCH	1
				7-2	QQTG0369A	DEUTSCH	1

